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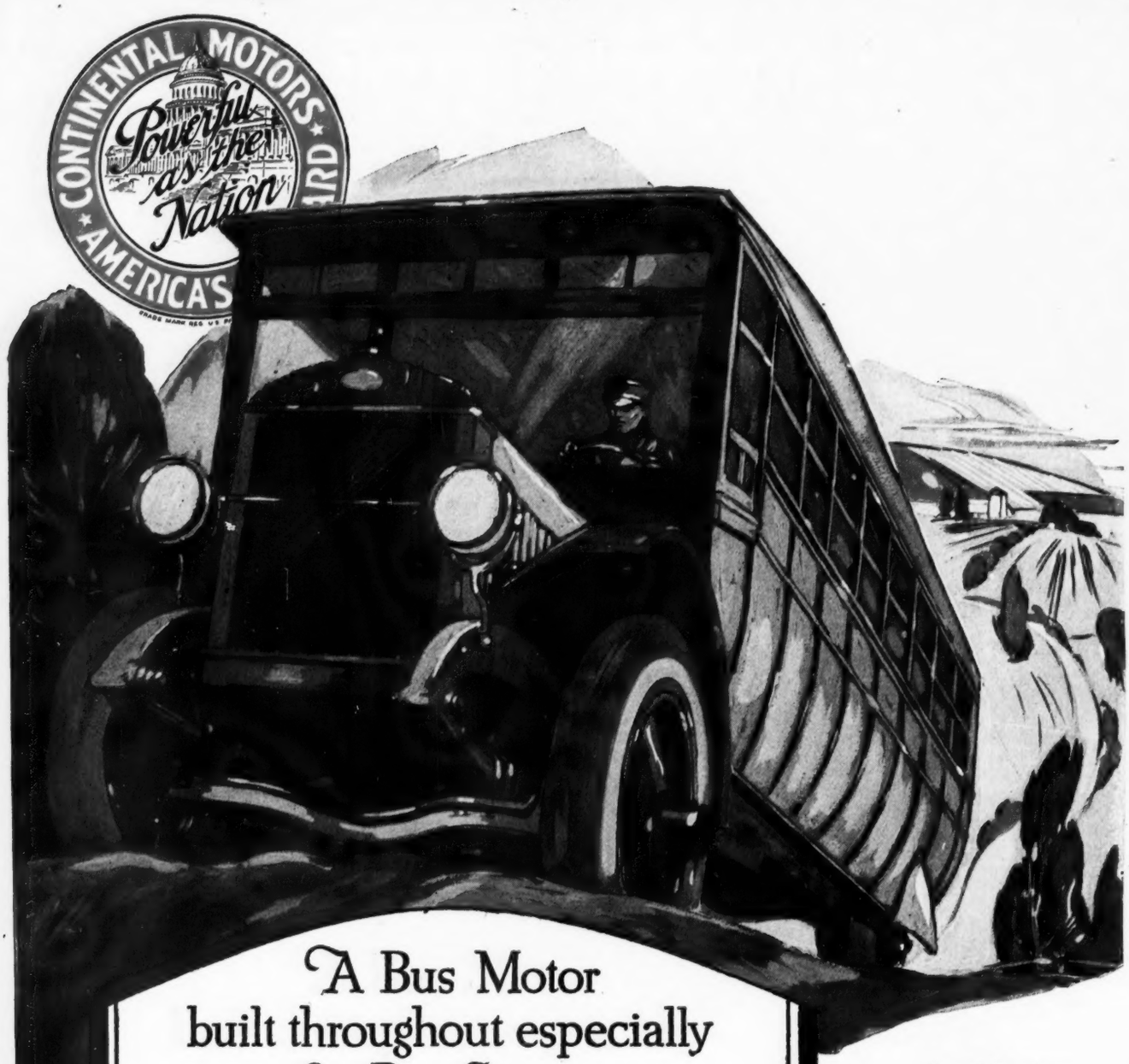

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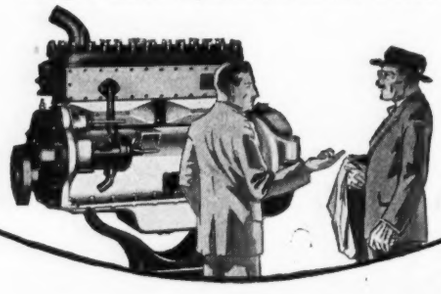


Specifications

Model 14H Bus Motor

Three-inch bearings
Seven-bearing crankshaft
Five-bearing camshaft
Pressure feed oiling
Dual ignition, both battery and magneto
Hardened steel timing-gears
Bronze oil-pump
Eight-inch diameter lighting generator
Provision for starting motor
Gasoline pump
Governor
Three to six foot air-pump
Oil strainer

Continental Motors will be exhibited at the New York and Chicago Automobile Shows and at the Good Roads Show at Chicago.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. 52 NEW YORK—THURSDAY, JANUARY 1, 1925 NO. 1

Wishing a

Happy New Year

We suggest that on this day, January 1, 1925, the automotive industry resolve:

To seek profits rather than production records.

To build only as many cars as can be sold and to sell the cars that are built.

To go out and help the dealers to be better business men.

To discard the double standard in buying and selling; to consider the other fellow in both cases.

To keep quality always in mind in designing and manufacturing, that the permanent benefits accruing from it may never be lost through attempts to gain temporary advantages.

To continue and to adopt those policies in buying, selling and manufacturing, which will make for the healthy growth of the industry as a whole on the well established theory that "he who serves best profits most."

Smoother Performance Is Sought in New Car Designs

Extra power for rapid acceleration obtained by use of more cylinders in many cases. Fewer black bodies used in models announced before show opening.

By Herbert Chase

MORE than fourteen new passenger car models are described in this issue. This first article summarizes the important features of these models. Next week will appear a complete story of the New York Show. It will contain special articles showing design trends as developed by all of the models exhibited.

SMOOTHER operation with comparative freedom from vibration, increased power for more rapid acceleration, easier riding and steering and improved braking and lubrication appear to be prime objectives in the design of new chassis which are described in following pages of this issue.

Many of these cars will be centers of attraction at the New York show, a comprehensive account of which will appear in next week's issue of AUTOMOTIVE INDUSTRIES, The following comments deal almost entirely with cars concerning which information has become available in advance of the show.

So far as bodies are concerned, there are many evidences of efforts to produce less expensive closed jobs, chiefly of the coach type, to improve general appearance, both interior and exterior, and to provide a more durable finish, chiefly by the use of pyroxylin lacquers.

Black bodies still are offered by some large producers, but the proportion of colored jobs is increased greatly. Even Chevrolet has given up the black enamel body finish, which has been standard for several years in favor of Duco, Dodge's new coach is to be done in blue lacquer and nearly all Studebaker models will have a nitro-cellulose finish also.

More Cylinders on Several New Models

A number of prominent makers have added chassis models with two or four more cylinders than in earlier jobs. Thus Hupmobile, Gardner, Kissel and Apperson, among others are ready with eight in line engines, while Overland and Willy-Knight present sixes for the first time.

On the other hand, Wills-Ste. Claire, which heretofore has built only eight-cylinder V-engines, has added a six. Rickenbacker, which has been marketing an eight in line for several months, has modified its six so that it closely resembles the eight and is said to be capable of giving practically the same rate of acceleration and smoothness of operation. At the same time Rickenbacker officials state that their sale of sixes has been about three times as great as that of the eight and that they expect the six to remain the backbone of their line.

Jewett and Paige continue adherence to six-cylinder models, but the Jewett six is redesigned and is said to give considerably more power, although the bore and stroke of the engine remain as before.

Stiffer and better balanced crankshafts are the rule, an indication that the demand for smoother performance and relative freedom from vibration is appreciated fully. Chevrolet, Jewett and Rickenbacker sixes all have larger crankshafts, while the new Hupp eight has a shaft which weighs almost 100 lb. The crank pins of the latter measure 2⅜ in. and the main bearings 2⅝ in. in diameter, although the cylinder bore is only 2⅞ in. and this is a five-bearing shaft.

Most New Models Have Four-Wheel Brakes

Practically all the newer car models, with the exception of the new Overland and Chevrolet, which, of course, are the lowest in price of any here considered, have four-wheel brakes either as optional or standard equipment. In most cases conventional Lockheed hydraulic brakes are used, but the new Willys-Knight six—the first Willys product to have brakes on all wheels—has a novel mechanically operated front wheel brake in which the shoes are expanded by wedges in contact with rollers which are moved in a direction parallel to the axle by suitable rods supported from the axle center.

Balloon tires now are offered as standard equipment on all the new models described in following pages, with the exception of Chevrolet, which will have them for the first time as optional equipment on disk wheels at slight extra cost. Chevrolet has given up the quarter elliptic springs used heretofore in favor of conventional semi-elliptics, while the new Overland six also will have semi-elliptic springs.

Air cleaners are receiving further recognition and are used as standard equipment on the Hupmobile, Willys-Knight and Rickenbacker models among those

cars described in this issue. The Hupp and Rickenbacker jobs are what may be called inertia types, since both depend upon a sudden change in direction of flow to throw out dust particles, while the cleaner used on the Willys is a filtering type.

Pressure lubricating systems are increasing in popularity and oil is fed by pressure not only to all crankshaft bearings, but in some cases to camshaft and other bearings in the crankcase. In other designs the camshaft is flooded with oil replenished by splash, while the new Chevrolet has overhead rocker arms lubricated by oil contained in thick felt pads carried on the pressed steel covers which now inclose these parts.

Easier steering is accomplished by use of larger reductions in steering gears and by employing antifriction bearings on knuckle pivots. In some cases a worm and sector gear are used where a worm and full gear were used formerly.

A feature of rear axle design which is becoming more popular is the straddle mounting of the bevel pinion.

Further use of aluminum alloys is to be noted in several of the new models. Duralumin connecting rods with light metal molded cast iron pistons are employed in the Hupp eight, while aluminum pistons are fitted in some of the new engines, among them the Willys-Knight and the Overland sixes.

Chevrolet has adopted a duralumin radiator shell which takes a high lasting polish similar in appearance to nickel, but less subject to such corrosion as is apt to result if extreme care is not used in the plating and polishing operations. Hupp eights will be fitted with pressed steel water manifold and lower crankcase made from rust-proof steel, while a chrome nickel iron alloy is used in head and cylinder castings and aluminum for the main crankcase.

In the new Wills Ste. Claire six overhead valves and other construction features similar to the eight-cylinder V models are incorporated, but a detachable cylinder head is used. A seven-bearing crankshaft is employed, as in several other sixes. Aside from the engine, the chassis is quite similar to the eight produced for some years past.

Among the cars assembled from standard components, Gardner, Kissel and Apperson present eight-in-line models of substantially the same bore and stroke. The engine used in the Gardner is the Lycoming, described several months ago in these columns.

Among the important changes in the Chevrolet is the use of a new banjo type rear axle housing in place of the built-up housing formerly employed. A single-plate clutch, in which the disk is dished slightly to facilitate ease of engagement, is employed. A conventional type of drag link in the steering system replaces the cross drag link formerly used.

Two-tone bodies done in lacquer are very much in style this season. Several of the new chassis have body finishes of this character and many of the new bodies mounted on chassis long in production are painted with side panels in one color or shade and the top of the hood, rear deck, if any, and portions of the body between the double-belt moldings, in another color. Various shades of green of the olive or sage brush hues, blues in marine and other shades, and brown, beige and buff colors appear to be most popular.

Nearly every line today contains one or more coach models, many of which carry the designation "brougham," which (as well as the term "coach") is not in accordance with well established terminology. In nearly all such bodies two fairly wide doors are used and, as a rule, the front seats tilt forward to facilitate ready access to rear seat, although some doors are wide enough for entrance without disturbing front seat occupants.

In the new Overland six line there will be only two bodies, a coach and a sedan, a fact which indicates that the open body is tending to disappear as a large production type. One or two of the new coaches will be finished in black lacquer, but a large majority of new bodies will be in colors, taking advantage of the fact that pyroxlyin finishes in color are almost as readily prepared as black.

One-piece windshields are fitted on several of the newer bodies, and especially in the "V.V" type, with a regulator above the glass for lifting it vertically and without hinging. This shield is fitted as regular equipment on closed Chevrolet models and most other closed bodies built by Fisher. There are, however, a number of examples of one-piece shields with hinges at the top edge which permit them to swing outward when additional ventilation is desired.

Some Comparative Specifications of Cars with New or Redesigned Chassis

Car	Wheel-base, In.	Bore and Stroke, In.	No. Cylinders	Displacement, Cu. In.	Four-Wheel Brakes	Standard Tire Size	Price 5-Pass. Phaeton	Lowest Price 5-Pass. Closed Model	Standard Finish
Apperson	130	3⅛ x 4½	8	276	.....	.....	$2,500	$2,800	Duco
Chevrolet	103	3 11/16 x 4	4	170.9	.....	30x3½ or 29x4.45 op. ex.	.....	.....	Duco
Gardner	125	3⅛ x 4½	8	276	Std.	30x5.77	1,995	1,995	Duco
Hupmobile	118¼	2⅞ x 4¾	8	247	Std.	35x6	1,975	2,375	Duco
Jewett	112	3¼ x 5	6	248.9	Opt. ex.	31x5.25	1,175	1,385	Duco
Kissel	126-137	3 3/16 x 4½	8	287	Std.	33x6	.....	.....	.....
Overland	112¾	3 x 4	6	169.6	.....	31x5.25	.....	.....	Sedan in Lacquer
Rickenbacker	117	3¼ x 4¾	6	236.4	Std.	31x5.25	1,395	1,595	Duco or Varnish, op.
Wills-Ste. Claire	128	3¼ x 5½	6	273	Std.	33x6	.....	.....	.....
Willys-Knight	126	3¼ x 4¼	6	211.5	Std.	32x6.20	.....	.....	.....

Heavy Crank and Light Pistons and Rods Are Features of Hupmobile Eight-in-Line

Engine of 225 cu. in. displacement develops 63 hp. at 2700 r.p.m.
Aluminum crankcase and chain type front end drive used.
Four wheel brakes and balloon tires standard.

THE Hupp eight-in-line made its début at the New York Show and simultaneously in dealer salesrooms in the larger centers throughout the country. Four body models are included in the line: a phaeton and a roadster, both of which list at $1,975, and a coupé and a sedan each priced at $2,325. The engine is an L-head design with 2⅞-in. bore and 4¾-in. stroke and is mounted in an 118¼-in. wheelbase chassis. Hydraulic four-wheel brakes and 33 x 6-in. six-ply balloon tires on natural wood wheels are factory equipment. The weight of the phaeton is 3135 lb. The four-cylinder line is continued with detail improvements described elsewhere in this issue.

The new engine peaks at 2700 r.p.m., developing 63 hp. and develops its maximum torque of 153 lb.-ft. at about 1000 r.p.m. It pulls evenly in high gear at extremely low throttle, accelerates smoothly even when the throttle is thrown wide open suddenly, and shows no perceptible vibration throughout its speed range.

Among the factors contributing to the smooth performance of the engine are a crankshaft weighing 99½ lb., light reciprocating parts and accurately machined combustion chambers. The crankshaft is drop forged of 45-55 point carbon steel heat treated to give a minimum elastic limit of 70,000 lb. per sq. in., machined all over and put in static and dynamic balance. It is supported in five bronze-backed babbitt bearings of the following dimensions:

	Diameter, In.	Length, In.
Front	2 19/32	1 27/32
Nos. 2 and 4	2 5/8	1 5/16
No. 3	2 5/8	1 1/2
Rear	2 5/8	2 9/16

The main bearing caps are rigidly mounted in recesses machined in the crankcase and are fastened by nickel steel studs. Four nickel steel bolts secure the flywheel to a flange forged integral with the crankshaft. In view of the weight of the crankshaft the flywheel has been made comparatively light. It is of semi-steel, machined all over, tested for balance, and has the teeth with which the starting motor pinion engages, cut on its periphery.

Connecting rods are I-beam section, duralumin forgings have tensile and compressive strengths of 60,000 and 50,000 lb. per sq. in. respectively. The caps are secured by two ⅜-in. nickel steel bolts. In their big ends the rods have spun babbitt bearings 1¼ in. long and 2⅜ in. in diameter. The center to center length of the rod is 9½ in. or twice the piston stroke.

New Piston Pin Fixing

Piston pins are ¾ in. in diameter and are made of 15-25 point carbon steel hardened and ground. They are clamped in the rods and have their bearings in the piston bosses. The clamping screw is threaded into a tapped steel bushing in the rod which gives a stronger and more durable construction than would be obtained if the threads were cut in the duralumin.

The pistons are permanent mold type, gray iron castings, 3⅛ in. high and weighing 14 oz. They are held to even weights within .01 lb. and are hand fitted to the block. There are two plain ⅛-in. rings above the pin and a 3/16 oil ring below. The weight of the connecting rod and piston assembly is 39 oz. Cylinder block and detachable head are cast of chrome nickel cylinder iron. The cylinder barrels are honed to a finish and each block is tested for hardness. The combustion chamber is a modified high turbulence type and its volume is about 25 per cent of the piston displacement. The actual compression pressure at 1000 r.p.m. is approximately 85 lb.

The crankcase is a separate casting of aluminum with upper portion of the flywheel housing integral. The lower portion of this housing is also of aluminum and is secured by studs. The oil pan is of rustproofed pressed steel. It has a welded-in false bottom and is fastened to the crankcase by studs, the plane of the joint being 2⅝ in. below the crankshaft axis. This latter feature, together with the transverse ribbing, gives a strong, stiff crankcase.

The engine is supported at four points in brackets riveted to the frame side rails by arms cast integral with the crankcase. Flexibility to relieve the engine of twisting strains is provided in the front brackets.

The timing chain compartment cover is a steel stamping and has a damping plate riveted at about the center of its inner surface to prevent drumming. This stamping also carries the cast

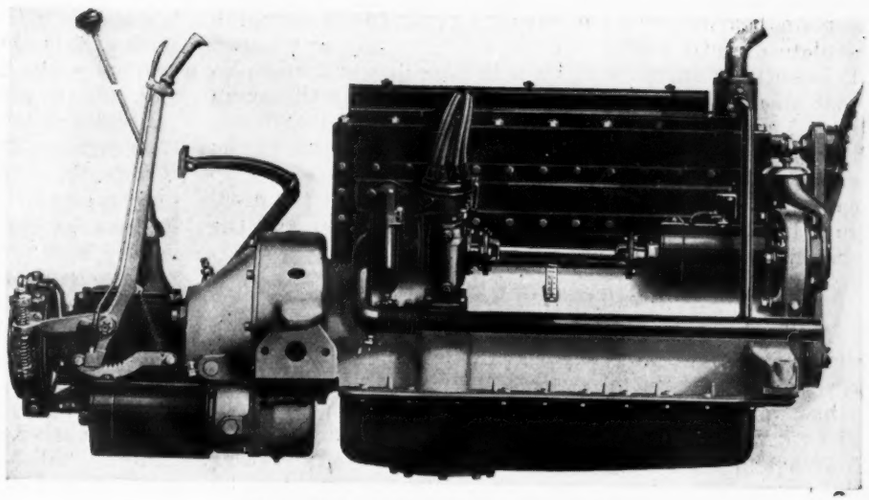
The new eight-in-line Hupmobile with sedan body

aluminum oil filler tube. The timing chain is a Morse, 1½ in. wide, and is adjusted by means of an eccentric pilot supporting the generator sprocket shaft.

The camshaft is a 15-25 point steel forging and is carried in the left side of the crankcase in five phosphor bronze bushings of the following dimensions:

	Diameter, In.	Length, In.
Front	2.122	1.625
Second	2.112	1.0
Third	2.102	1.0
Fourth	2.092	1.0
Fifth	2.082	1.0

Thrust from this shaft is taken by a spring and plunger bearing against a steel plate on the inner side of the timing compartment cover.



Hupmobile eight-cylinder powerplant

One-piece, drop forged alloy steel valves are used. The intake valves are a chrome-nickel alloy and the exhaust valves of a steel containing silicon and chromium. The former have a clear diameter of 1¼ in. and the latter of 1 3/16 in., the list being 5/16 in. and the seat angle 45 deg. in both cases. Valve stems are 21/64 in. in diameter and operate in cast iron guides 4⅞ in. long, which are pressed into the block.

Valve Adjustment

The clearance adjustment is made entirely on the valve stem, the lower end of which is threaded and fitted with a lock nut and a chrome vanadium adjusting nut or thimble. The valve springs exert a pressure of 45 lb. and are retained by a collar which is held against rotation by means of an integral key fitting into a slot cut in the threaded end of the valve stem. The lower face of this washer rests on the lock nut on the adjustment.

The valves are set at an angle of 2¾ deg. to the cylinder bore and are operated through the intermediary of rocker arms. This construction is said to reduce the weight of the moving valve parts and also to minimize the side thrust on the valve stems. The rocker arms are chrome vanadium steel forgings, heat treated and case hardened, and assembled in two groups of eight on rocker shafts which are supported by castings mounted on the cylinder block. To insure uniform wear the rocker shoes extend clear across the face of the cams. The weight of the entire rocker arm is 3.15 oz. and it is said that the weight of the moving end is equivalent approximately to 1 oz. The weights of the inlet and exhaust valves are 3.71 and 3.49 oz. respectively.

Removal of the pressed steel valve cover plate means the valve chamber readily accessible for clearance adjustments or for removal of the rocker assemblies. This cover plate incorporates one of the most novel features of the engine as it also serves as an air cleaner and a hot air stove. The carbureter air supply is drawn in through louvres in the face of this plate entering a chamber formed by a stamping which is welded to the inner surface of the cover. The louvres open toward the rear of the car and, consequently, the air must make a sharp turn to enter them, thus separating the dirt by inertia. As the air chamber is located in the valve alley, which is open to the crankcase, some preheating is secured.

A short aluminum elbow conducts the air from this chamber to the carbureter, which is a 1¼-in., Model OX-2, Stromberg plain tube type. Fuel is fed from the 16-gal. tank at the rear by a Stewart vacuum tank.

The intake manifold and the hot spot construction show clearly in the sectional side view of the engine. The ends of the manifolds open into passages cast integral with the exhaust manifold and leading to the intake ports. Additional heat is applied to the mixture here through the common walls between these passages and the exhaust manifold. Exhaust gases leave the manifold at its center and are conducted forward and then downward and backward.

Ignition is by a closed circuit, semi-automatic Atwater-Kent system. The distributor drive is from the rear end of the generator through a short shaft with flexible couplings at each end, to a pair of helical gears contained in a cast housing mounted on a bracket cast on the side of the crankcase. The distributor rests on the top of this housing. The high tension cables are protected by a pressed steel base fastened to the head with studs and knurled nuts.

A novel feature of the cooling system is a pressed steel water distributing manifold extending the entire length of the right side of the block. The inner wall of this manifold has a number of holes in it through which the water enters the water jackets.

Stainless Steel Pump Shaft

The pump, which is supported from the distributor gear housing, is driven from the rear end of the horizontal shaft of the distributor drive, the thrust being taken by a button mounted on the inside of the pump housing. The pump shaft is of stainless steel. The packing on this shaft is easily adjustable from the outside and the bearing is lubricated by an Alemite fitting. The pump may be removed without disturbing the distributor drive.

The water leaves the jackets at the front end of the engine through a syphon thermostatic valve. This valve is set to open when the water temperature reaches 130 deg., prior to which time the water is by-passed through an exterior steel tube connecting with the water inlet pipe. The capacity of the cooling system is 4¾ gal.

The fan has two blades and its shaft is carried by an adjusting arm from the front of the block. The bearing is cast iron on a hardened steel shaft lubricated from a reservoir contained in the hub. The drive is through a V-belt from a pulley on the crankshaft.

Lubrication System

The large number of points at which positive lubrication is provided is one of the features of the engine. Oil pressure is developed by a gear oil pump located in the oil pan and driven from the lower end of the distributor shaft. This unit is supported from No.

4 main bearing web and may be removed by dropping a plate directly under it on the bottom of the oil pan. It is entirely surrounded by a fine mesh wire screen so that all oil entering it is filtered. On leaving the pump the oil is conducted through drilled ducts to a distributor tube extending the length of the engine and cast in the crankcase. From this tube drilled passages lead to each main bearing. The crankshaft is drilled for pressure lubrication of the connecting rod bearings and the crankpins are bored out.

Oiling Camshaft and Rocker Bearings

From the main bearings the oil also passes through drilled passages to the camshaft bearings and thence through similar ducts to the hollow rocker shafts. The lubricant leaves the latter shafts through radial holes at each rocker bearing. Some of the excess oil at these bearings is discharged through holes drilled in the rocker hubs and flows down the tops of the rocker arms by gravity. A hole drilled in the rocker shoe delivers the oil to the cams. The timing chain is lubricated by overflow from the pressure relief valve which is located at the front end of the main distributing header. The distributor drive bearing is also lubricated under pressure through drilled ducts. The capacity of the system is eight quarts and the amount of oil in the crankcase is indicated by a float gage.

The starting-lighting system includes a storage battery that is exceeded in size on not more than two or three other makes of car. It is a 6-volt, 17 plate Willard with an ampere-hour capacity of 155. The starting motor is also of unusual size, showing a lock torque of 34 lb.-ft. It is sleeve-mounted on the bell housing and has a Bendix shift. The generator is a third brush type and, like the starting motor, is made by Westinghouse.

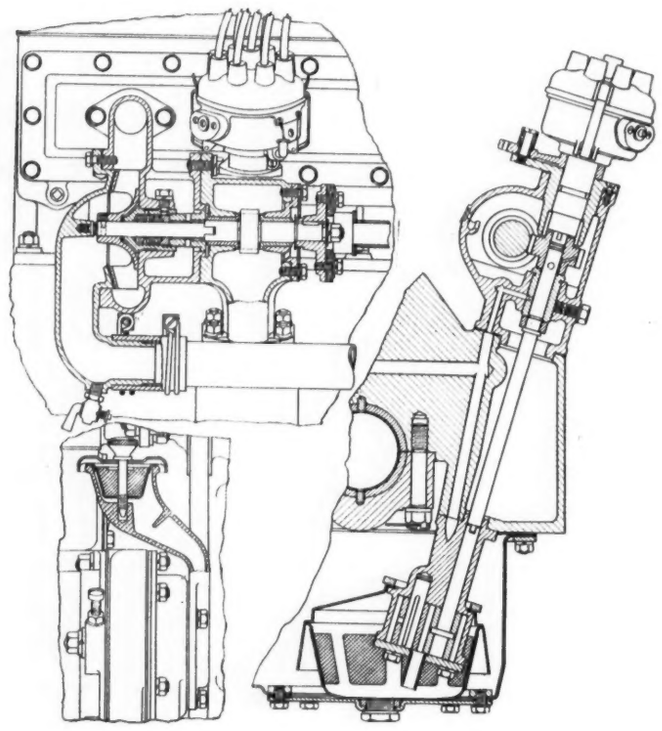
Clutch and transmission are mounted as units with the engine. The former is made by the Long Mfg. Co. Briefly the clutch is a dry plate type with an 8¾-in driven member faced on both sides with molded Raybestos. No adjustments are necessary on it, except for pedal clearance. Annular ball bearings are provided at the clutch gear shaft pilot and the release collar. The entire clutch assembly is completely inclosed in a cast aluminum bell housing.

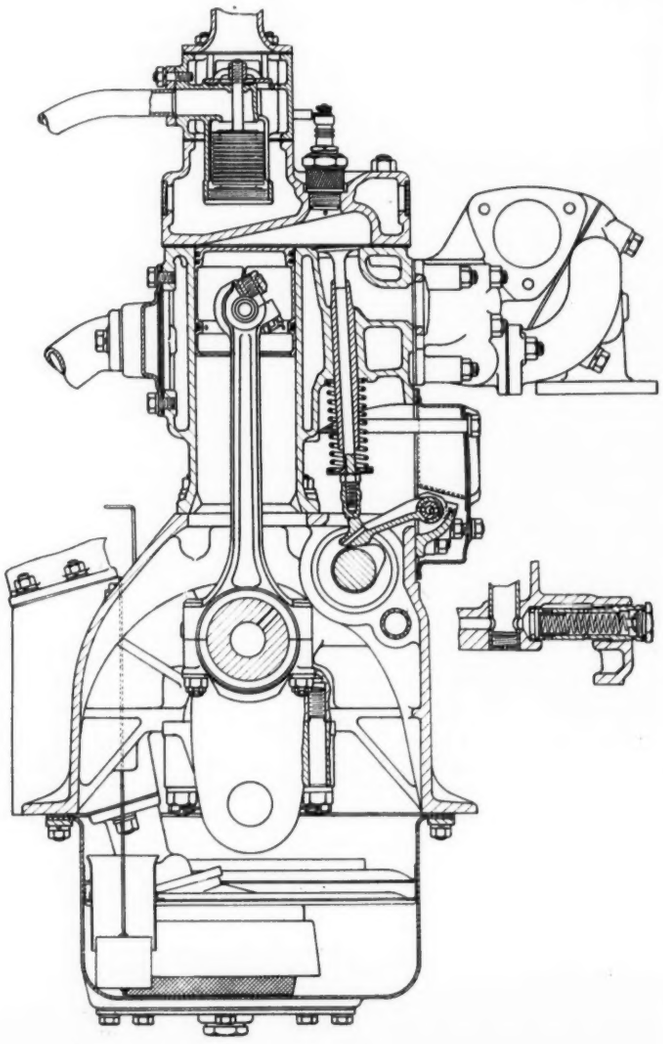
The transmission is a three speed, selective unit providing reductions of 3.11 to 1 in low, 1.69 to 1 in second, direct in high, and 3.78 to 1 in reverse. The gears are of high carbon chrome nickel steel with burnished teeth. Annular ball bearings support the clutch gear shaft and the rear end of the main shaft. The countershaft gears are cut from one forging which rotates on Hyatt roller bearings. The main shaft pilot is also a Hyatt. The speedometer drive is taken from the rear of the main shaft.

Final Drive

Power is transmitted to the rear axle by a 2-in. tubular propeller shaft with ball and trunnion type universal joints at either end. Rear axle torque and propulsion are taken through the springs.

The rear axle is a semi-floating, helical bevel design providing a reduction of 4.64 to 1. Axle shafts are of





Above—Detail views showing mounting and drive of inclined shaft connecting to oil pump below and distributer above; also breather and oil filler bolted to front of timing gear housing. On right —Cross section through Hupmobile eight-cylinder engine

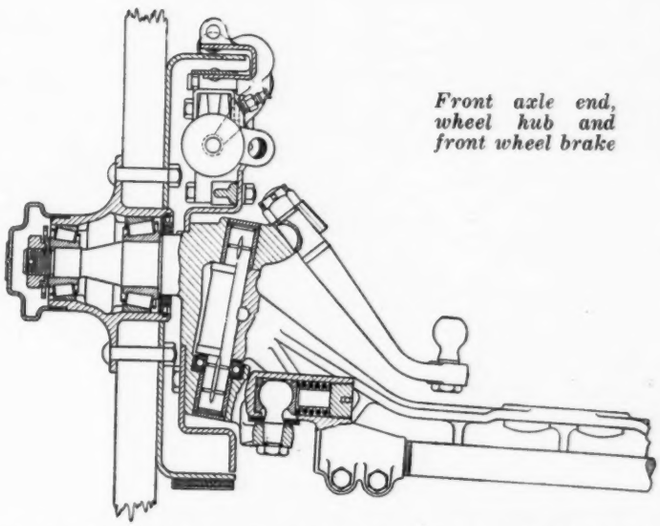
high carbon chrome nickel steel. They are supported at their outer ends in taper roller bearings and are removable endwise without disturbing the differential. The spring seats, which are integral with the flanges to which the brake carriers attach, are riveted to the pressed steel, banjo type axle housing. The differential is supported in two roller bearings in a cast steel carrier studded to the axle housing. The drive pinion and its shaft are an integral nickel steel forging. The shaft is straddle-mounted in a double row ball bearing forward and annular ball bearing aft. The former bearing is carried in an adjusting sleeve.

Front Axle Design

The front axle is a reverse Elliot type and is drop forged of 45-55 point carbon steel. It has an I section except at its ends where it is forged round to give it the torsional strength necessary to withstand the strains imposed by the front wheel brakes. The steering knuckle and arms are chome nickel steel drop forgings. The steering arms are a taper fit in the knuckles and are locked and keyed in position.

Easy steering with balloon tires has been obtained by the use of ball thrust pivot bearings, transversely inclined king pins and a Ross cam and lever steering gear. The maximum swing of the front wheels is 60 deg., which represents two and one-half turns of the steering wheel. The turning radius is 19 ft. in either direction.

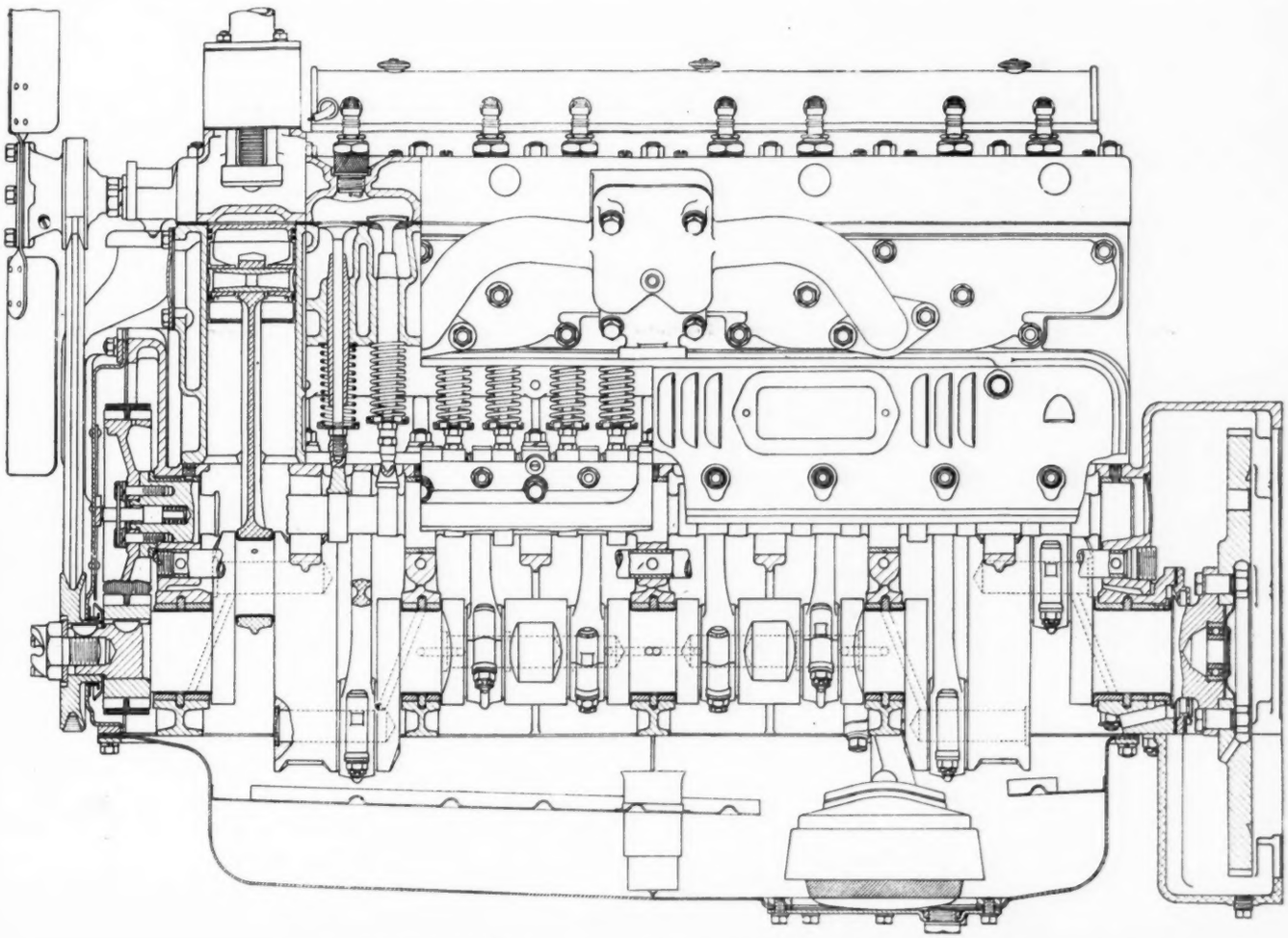
Four-wheel external service brakes of the Lockheed hydraulic type are regular equipment. The master cylinder is mounted on the cross member bracing the frame



Front axle end, wheel hub and front wheel brake

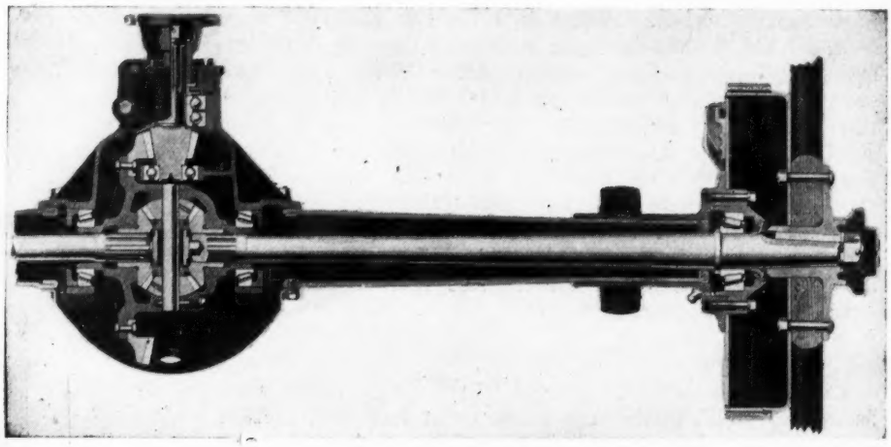
at the front rear spring hangers. The handbrake acts externally on a drum at the rear of the transmission. The service brake drums are 14 in. in diameter and 2 in. in width.

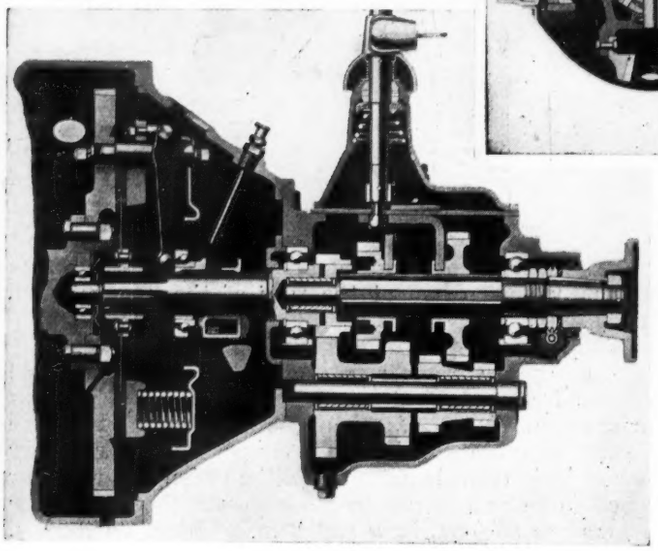
Semi-elliptic chrome vanadium steel springs are used front and rear, the latter being underslung. The front springs are 37 9/16 in. long by 2 in. wide and have nine leaves. On the touring and coupé models the rear springs have eight leaves and on the sedan and roadster models nine and seven leaves respectively. The rear springs are 56½ in. long and 2 in. wide on all models.



Side elevation partly in section of Hupmobile eight-cylinder engine

Below — Section through clutch and transmission. On right—Section through rear axle





Spring eyes are fitted with phosphor bronze bushings and all spring bolts are ¾ in. in diameter.

The frame side rails (6½ x 2 x 5/32 in.) are straight but converge toward the front of the car. There are three pressed steel cross members (the one at the front rear spring supports being a built up unit) and two tubular members to resist weaving. Provision is made on the frame for mounting front bumper and rear fender guards. The overall road clearance is 9½ in.

Lighting equipment consists of two 21 c.p. headlamps with non-glare lenses, dimmers regulated by switch on dash, cowl lamps, combination tail and stop light, and instrument board light of the push and pull type. The lighting and horn circuits are protected by a 20 amp. fuse. The closed bodies have dome lights. All models are equipped with a cigar lighter mounted on the dash and provided with 12 ft. of cord. The heating element on the lighter is arranged so that it may be replaced with a handy lamp which is included in the regular equipment.

The four body models are all well stream-lined and a belt line molding, beginning at the radiator shell and extending clear around the body, accentuates their length. The radiator shell is nickel plated and has the characistic Hupp shape. All models are finished in Duco, an option of either blue or beige being offered with appropriate striping. The closed models are black above the belt and have a bead molding at the base of the superstructure.

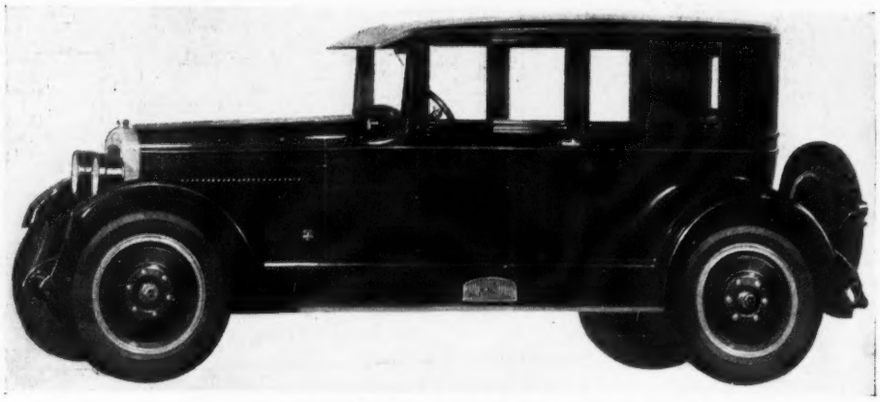
In the open models the upholstery is leather in either gray blue or tan. Wool mohair in either platinum gray or brown is used in the closed models. The seat cushion springs are of the Marshal type.

Regular equipment on all models includes one-piece windshield, automatic wiper, cowl ventilator, rear view mirror, transmission lock, gasoline gage on dash and robe rails. The roadster has a luggage compartment in its rear deck and is fitted with polished guard rails. Closed models have visors integral with the top and are equipped with heaters.

Two New Bodies Shown on Nash Advanced Six Chassis

TWO new bodies, termed the low priced Advanced Six Sedan and the Advanced Six Victoria are being offered by Nash, both of them being on the Advance Six chassis. The new sedan is a two-door five-passenger body trimmed in mohair and is listed at $1,485.

Four adult passengers are carried comfortably in the "Victoria," which in reality is a coupe or close-coupled sedan with quarter windows of almost full size but with upper rear corners rounded in a fashion similar to some other Nash closed models. The Victoria is listed at $2,090.



New two-door Nash sedan which lists at $1,485

Chevrolet Redesigns Engine and Changes Frame and Spring Arrangement

New model has single dry plate clutch, pressed steel, banjo type rear axle and semi-elliptic springs. Features include Duco finish, duralumin radiator shell and increased leg room.

By W. L. Carver

A NEW Chevrolet car with Duco finish, longer bodies, complete semi-elliptic spring suspension and outstanding changes in every mechanical detail is making its first appearance at the New York Show. The wheelbase remains at the former figure of 103 in.

Aside from the striking changes in frame and spring arrangement, the engine has been redesigned to incorporate a larger crankshaft, the rocker arms are inclosed and provided with means of automatic lubrication, and the manifolding has been redesigned to provide better distribution. A newly developed single dry plate clutch is inclosed in a bell housing which carries the transmission case.

A pressed steel banjo type axle with heavier gears mounted on ball bearings throughout and larger brakes are other features of the new model, while the front axle has been made heavier to conform to the new spring suspension. The former crosswise steering gear arrangement has been supplanted by a conventional drag link layout.

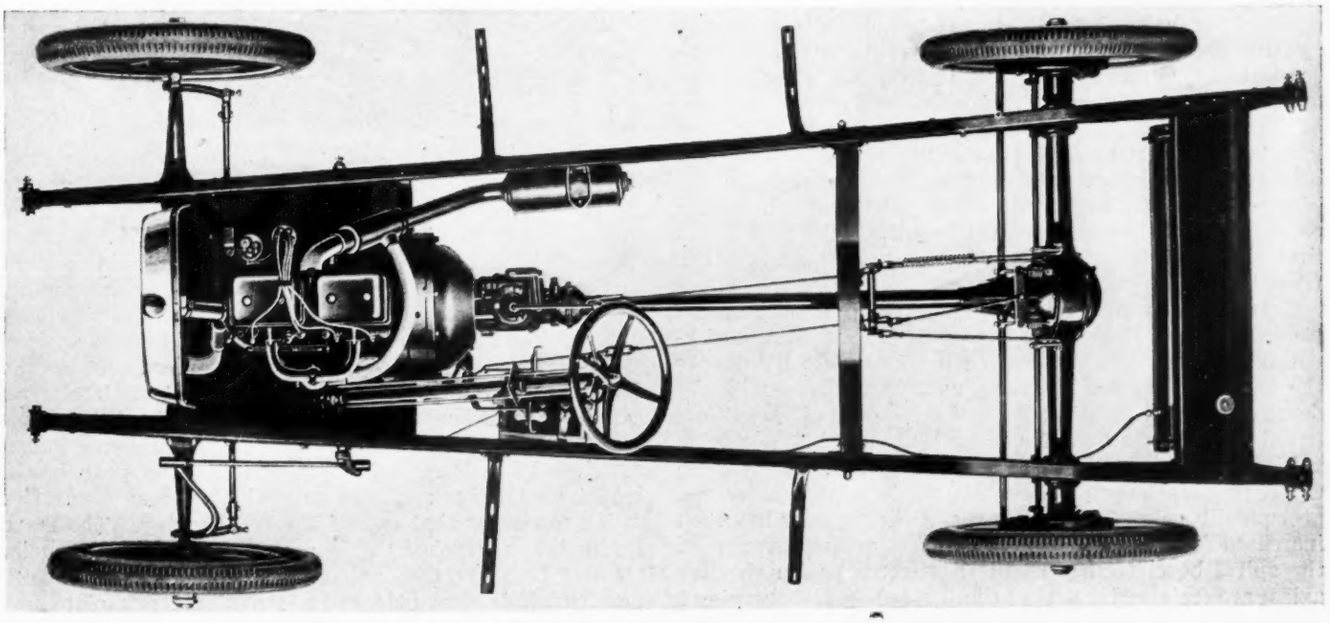
Five body styles are standard. The black enamel finish which has been characteristic of all but the sport models heretofore, has given way to the color possibilities of Duco finish; on the radiator shell it has been replaced by a polished finish. However, the shell is not plated but is made of duralumin, and, therefore, is rustproof. The touring car, roadster and coach are finished in dark blue. The sedan body is finished in aqua-marine blue, with the upper panels in black. In the coupé the upper panels are black, while the body is finished in sage green.

All fenders are black enameled. Black wood wheels fitted with 30 x 3½ in. fabric tires on the open cars and cord tires on the closed types are standard equipment. However, disk wheels fitted with 29 x 4.45 in. balloon tires are optional at a slight additional cost.

"Bodies by Fisher"

All bodies are built by Fisher, and the closed bodies are fitted with the one-piece ventilating windshield and automatic cleaner, which is controlled at the instrument board. The coach and sedan are equipped with dome lights, and the latter has a robe rail at the back of the front seat. Cowl lights are standard on all models.

Although the wheelbase remains the same, all five-passenger bodies have been made about 3 in. longer, with consequent increase in legroom in both front and rear compartments. The rear seat and floor boards have been lowered, and the floor board just back of the front seat has been inclined to form a comfortable foot rest. Doors on the closed cars are restrained by an all-metal strap mechanism at the top. The speedometer and dash lamp are located at the center of a new all-metal Duco-finished instrument board, and the switch plate and instruments are arranged symmetrical with them.



Showing the chassis of the redesigned Chevrolet. Five cross members connect the side channels, three concealed by the engine. Frame has conventional kick-up

In redesigning the chassis and powerplant, the objects were improved performance in all phases and a greater measure of true service. Under these heads are included riding comfort, ease of handling, smooth power flow for acceleration, protection of all moving parts with consequent longer life, ease of adjustment of all wearing parts and, finally, that more or less intangible quality, pride of ownership.

Frame Provided with Kick-up

With the new spring arrangement the frame has been kept low by providing it with the conventional kick-up over the rear axle. The side channels are 4½ in. deep at mid-section, with a thickness of 5/32 in. and flanges 1½ in. wide. At the tapered ends or spring horns, the full width of the frame blank is utilized for widening the lower flange. These straight side members are set well apart at the rear end and somewhat closer at the front, and they are tied together by five cross members. A pressed steel cross member which supports the radiator is set just ahead of a drop-forged cross member, riveted into both side members, which forms the front engine support. The third cross member, of pressed steel, supports the engine in front of the inclosed flywheel. An inverted pressed steel channel at the front anchorage of the rear springs forms the fourth, while the fifth is a wide plate at the rear which forms the gasoline tank guard and is riveted to both flanges of the side members.

Spring arrangement and anchorages are entirely conventional, with drop forged or malleable cast brackets at both ends of the front springs and for the rear end of the rear springs. Heavy stamped steel brackets which are gusseted with the fourth cross member form the anchorage for the front ends of the rear springs. The springs are of chrome-vanadium alloy and are fitted with bronze bushings at all eyes. Front springs have seven leaves and are 36 in. long and 1¾ in. wide. The rear springs, which are nearly flat under the rated load, have eight leaves on the touring car and are 54 in. long and 1¾ in. wide. There is one leaf less on the roadster and one more on the closed cars.

New Steering Gear Conventional Design

Along with other parts, the steering gear has been changed to a more conventional design. The steering gear proper is bracketed to the frame at the rea anchorage for the left front spring. A worm and wheel with complete adjustment of both shafts operates a ball ended drag link. Joints at the worm wheel and pitman arm are of the serrated type. In place of the usual tube, the drag link is a solid rod. The front axle is the conventional drop forged construction, with steel thrust washers at the king pins, and has been made somewhat heavier to be able to sustain the greater moment resulting from the fact that the pads for the semi-elliptic springs are farther from the ends.

Rear springs are underslung on a new electrically welded pressed steel banjo-type axle. The entire differential mechanism is mounted in a carrier which includes the torque tube, the complete unit being bolted to the front face of the banjo. Both the pinion and the differential spider are adjustable and mounted on ball bearings.

While the gear ratio (3.82 : 1) is substantially the same as previously, the gears have been made much heavier and are spiral bevels. The diameter of the ring gear has been increased from 8 to 8½ in., allowing a greater overlap of the spiral bevel teeth. In the new construction the live axles are retained at the (ball type) wheel bearings, while in the old split axle they were retained at the differential. Brakes have been increased in size, the outside diameter of the drums now being 11 in. The service brakes, which are controlled through an equalizer mounted on the differential carrier, are operated by a double acting mechanism similar to that used recently on the older model. Pressed steel members form the emergency brake shoes, and operation is through an expanding toggle mechanism.

Externally the engine has been modified by the valve and rocker arm covers, the new manifold system and the adoption of the bell housing, which latter involves a change in the mounting of the starting motor. The two-bladed fan used for some time has been continued. The two pressed steel rocker arm covers are held down by four bolts. Lubrication for the rocker arms is provided by thick felt pads which are riveted on the inner upper surface of each cover. These pads are saturated with oil and are of such thickness that contact is made with the rocker arms at the valve ends and the bearing hubs. Thus the supply of lubricant is transferred gradually to the various working parts.

Intake Manifold Changes

Although the welded steel tube intake manifold construction has been retained, the vertical leg has been shortened materially and the horizontal branches, which formerly were straight, have been given a ram's horn effect to prevent loading. This is said to make for easier starting in cold weather. Carter and Zenith carburetors are fitted interchangeably, except that all export cars have the Zenith. To insure better distribution, a cylinder of about 2 in. length, and of an inside diameter only slightly larger than that of the tubular manifold, is inserted into the siamesed intake ports. Inside this cylinder a nest of tubes about ¼ in. diameter is formed by a suitably bent metal strip. The object of the device is to insure that each cylinder of the pair receives the same volume of mixture of the same strength.

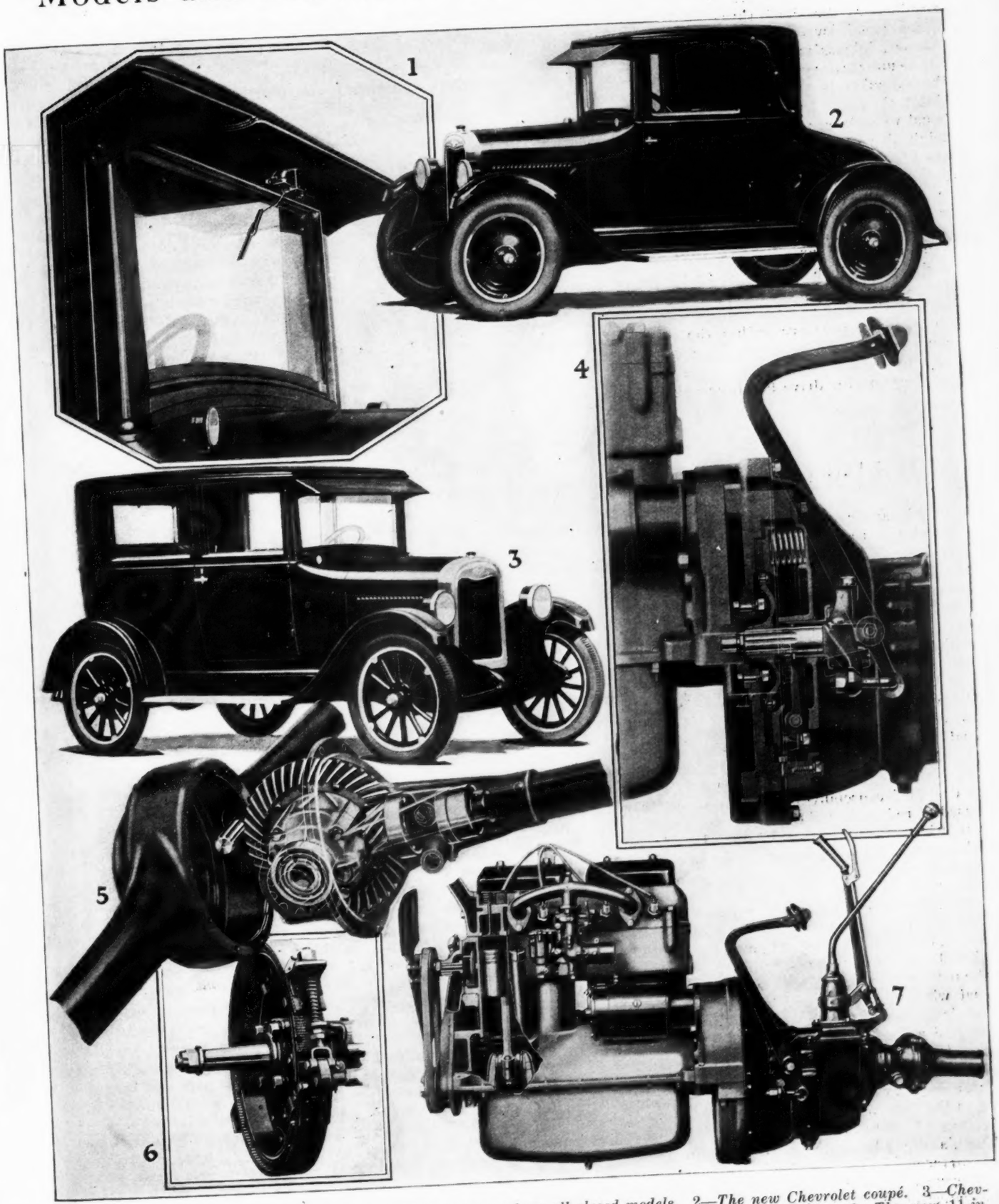
To eliminate torsional deflection and consequent vibration, the crankshaft has been made much heavier. The projected area of the center bearing has been increased more than 20 per cent by a slight increase in diameter and a considerable increase in length. Recognizing that the center bearing carries the greatest load, the designers have made this a bronze-back-babbitt-lined bearing and provided it with pressure lubrication through a copper tube from the oil pump which is mounted on the back end of the generator. The two end bearings, which are of somewhat greater diameter, are die-cast babbitt bearings with splash lubrication, the same as formerly.

Size and Dimension Increases

The cheeks of the crankshaft have been made much heavier and are now cross-shaped in section. The diameter of the crankpin bearing has been increased ⅛ in., to 1½ in., to add to the torsional rigidity of the crankshaft. The light weight connecting rod and thin section cast iron pistons are continued, but the latter are now fitted with an oil scraper ring and relief holes at the lower groove. Valves are now made of heat-resisting alloy steel.

Greater clutch life and better performance are expected from the fully inclosed flywheel construction. The upper half of the bell housing is bolted to the back of the crankcase in place of the former bracket or wishbone, and is matched by a lower cast iron cover. The gear box is belted on the back of the pressed steel pan or carrier, which completes that end of the bell housing. The starting motor is attached to the upper, cast iron bell housing member by a barrel mounting and two bolts. An entirely new clutch is now fitted. It is a single dry plate unit which incorporates a very light rotating member. As illustrated, the friction rings float freely within the clutch, therefore, the rotating weight includes only the

Models and Details of the New Chevrolet Line



1—The V. V. one-piece windshield with automatic wiper used on all closed models. 2—The new Chevrolet coupé. 3—Chevrolet coach. 4—Phantom view of the new single, dry plate clutch. 5—The banjo type rear axle. 6—The new 11-in. brake. 7—Cutaway view of the powerplant

central spider and four saw steel segments. These segments are dished slightly to promote smooth engagement, as the convex portion of the segment is engaged first.

Elimination of internal adjustment was one of the objects aimed at in this design. The only "owner adjustment" is at the short threaded link which connects the clutch pedal lever with the throwout lever. In a like manner, lubrication in the accepted sense has been rendered unnecessary. A durex bearing is installed to pilot the assembly in the rear end of the crankshaft, and the clutch throwout bearing is of graphite composition. Exhaustive tests are said to have shown that these bearings fulfill all requirements of clutch operation. The arrangement of the levers and wearing surfaces is such that natural wear at the various points neutralizes and tends to maintain the various control parts in their original relationship.

The four arms within the clutch are jig-finished to a standard form. The outer ends bear against hardened steel strips which are bolted to bosses on the cast iron clamping plate. There are four non-adjustable springs between the clamping plate and back cover which provide the requisite pressure within the clutch. The light rotating member slides freely on a ten-spline shaft.

No important changes have been made in the gear box. The speedometer drive has been simplified to some extent and the reverse idler pinion is made in one piece, whereas formerly it consisted of two sections connected by a jaw clutch. The barrel of the idler has been made much heavier, to eliminate the heat treating troubles of the old construction.

Brake Operating Countershaft

The brake operating countershaft is mounted in brackets underneath the fourth cross member. The battery is carried on the left side member under the floor boards of the front compartment, the same as formerly, and opposite to it the muffler, which is in one-piece with the exhaust pipe, is carried on a clamping bracket. The stove connection is through flexible tubing which loops around the rear of the cylinder block.

Fenders retain the characteristic Chevrolet appearance, although the shape of the front aprons has been changed to conform to the new frame. Enameled dust guards are placed between the foot board and the body. The engine is protected by dust pans which attach to the lower flange of the crankcase and the inner faces of the frame side members. The gasoline tank of 10 gal. capacity is suspended by steel straps from the rear cross member, while the tire carrier at the rear varies with different bodies and tire equipment. All chassis lubrication points are fitted with pressure gun connections.

Glidden Company Develops Lacqueroid System of Finishing

STILL another lacquer finishing system has been developed recently by a prominent varnish manufacturer, the Glidden Co. of Cleveland, Ohio. This is termed the Lacqueroid system, all coats of which, except the primer, are nitrocellulose base products. A striping enamel and rubbing and polishing compounds which are not lacquer base materials, but are well adapted for use with such materials are being marketed also by the Glidden Co. for use in producing the desired finish.

All coats used in the new system are air drying, but those who have suitable forced drying systems can save considerable time by using the ovens in drying the priming coat. In this case the primer used differs slightly from that employed for air drying, being slightly longer in oil than that furnished for use in air drying. The primer is designed especially for use under lacquer and is composed of red oxide and other pigments ground in an oil and varnish vehicle. It is said to dry to a tough durable film which resists the action of lacquer solvents used in succeeding coats, and to possess exceptionally good adhesive properties on wood and all metals.

Air drying primer will dry in 18 to 24 hr,, while the forced drying type requires baking for one hr. at 300 deg. Fahr., or 2½ hr. at 250 deg., or 5 hr. at 200 deg., or 14 hr. at 160 deg. After the body has been cleaned thoroughly, the primer is applied either by spraying or brushing. This coat when dry is followed by two or more spray coats of red lacqueroid surfacer mixed with equal parts of lacqueriod reducer, the number of coats depending upon the condition of the metal.

If file or other surface irregularities show after the surfacer coats are on, a red lacqueroid glaze may be knifed on in the form supplied by the Glidden Co. or thinned with lacqueroid surfacer reducer furnished for this purpose. The glaze may be applied within 30 min. after the last coat of surfacer.

Lacqueroid surfacer and glaze are claimed to fill metal imperfections rapidly, to sand more easily than some other materials of similar type and to form a smooth and impervious surface which is capable of an effective and durable union with the enamel coats.

After the final coat of surfacer has dried at least 5 hr. it can be surfaced quickly by rubbing first with No. 180, or corresponding grade of water proof sandpaper, and finishing off with No. 220 paper, using plenty of water.

Not less than 30 min. is allowed for all moisture to dry off after which any bare spots which show through the surfacer are touched up with lacqueroid red oxide touch up primer, which dries in two hours. After these spots have dried the entire body is dry sanded lightly with No. 280 sandpaper and the dust wiped off with a tack rag or lintless cloth.

Three coats of colored lacquer enamel next are sprayed on at intervals of one hour or more. Enamel used in the first three of these coats is reduced with equal parts of Lacqueroid enamel reducer, while the final coat is reduced in the ratio of three parts reducer to two of enamel, when extra smooth work is wanted. If desired, the second coat of enamel can be sanded lightly before applying the final coat in order to decrease the amount of rubbing on final coat. The final coat, if it is to be polished, should be allowed to dry over night before rubbing.

Provides High Lustre

A high lustre is secured by rubbing with Lacqueroid rubbing compound applied liberally on a folded cheesecloth, using long, straight even strokes until desired surface is produced. This compound is said to cut almost as fast as sandpaper but to leave fewer scratches and to make it unnecessary to remove the slush which is formed when using sandpaper with oil or water.

When the desired surface is secured, any striping can be done by reducing the desired shade of Lacqueroid enamel to the desired consistency, using touch-up Lacqueroid enamel reducer, or by thinning the desired shade of japan color with turpentine and finishing varnish. After the stripe is thoroughly dry, a still higher polish can be secured by the use of Lacqueroid polish.

Just Among Ourselves

What Do You Think About This and That?

AS we sat down to write this page, the first one for the New Year, we lit our pipe—the one we like, not the new one we got for Christmas—and began our annual effort to blow smoke rings. Meeting with our usual failure, our mind wandered away to the offices and friends where "Just Among Ourselves" makes its weekly visit. Wouldn't it be great, we meditated, if we could see your face and read your thoughts as you perused the page—provided, of course, that you peruse it at all. What greets these odd bits of comment about things automotive—smiles, horse laughs, frowns, cussing or—once in a while at least—a little silent approbation? A public speaker, if he's even a fair psychologist, knows each time he talks whether he has hit or missed the mark. A columnist has to work at longer range. But he's almost human, just the same. He likes to get letters telling him he's off his base as well as those of more pleasing character. We'd be mighty glad to hear from you, just to get a little better acquainted.

Department Store Provides Parking Space

IT often happens that business, seeking to better its own position, helps to solve problems which perplex the community at large. Perhaps something like this will happen in connection with the parking problem. Franklin Simon & Co. in New York has made a good start by providing for its customers parking space in a private garage. Customers who drive their own cars will have their cars driven from the store to the garage and back again by experienced chauffeurs. All cars will be insured by the store against liability, property damage, fire and other contingencies. The garage will house 150 cars. It would not be surprising if further developments of similar character were carried forward, since the parking problem undoubtedly affects sales in downtown department stores in many cities.

When You Crawl Back of a Truck

SUGGESTED experiments with traffic control in Paris which would exclude horse-drawn and slow-moving vehicles from certain streets during specified hours are receiving considerable attention and favorable comment in London. And even the proud owner of horse and motor-drawn trucks in this country might be willing to consider such restrictions with favor if his wife was kept behind one of the trucks for a sufficient length of time.

God of Volume Still Takes Toll

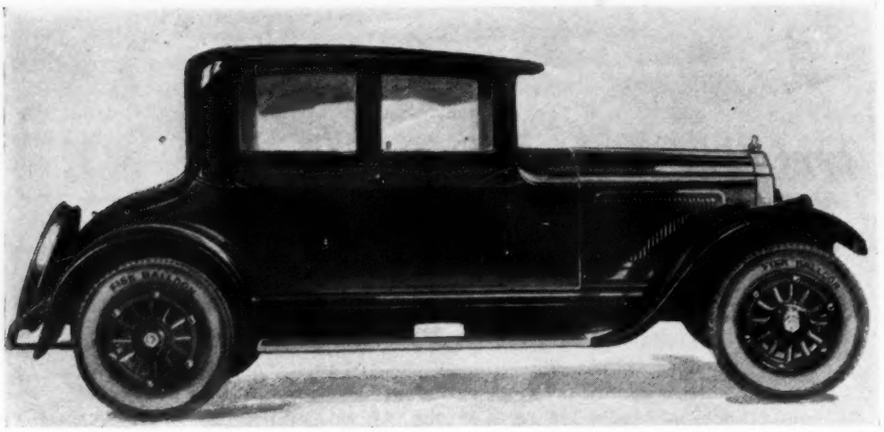
WE got a letter from C. H. R. the other day in which he deplores the tendency among parts makers to cut prices to almost any level in order to get business, and wonders if there isn't some way to get the practice eliminated. Well, C. H. R. isn't the only one who has been deploring and wondering in the last few years. We are complimented by the fact that he asks us if we can't figure out some way to remedy the situation, but if we could we would be making plans to retire to our estate on Long Island in a few years instead of looking forward to riding Pullmans between N. Y. C., Detroit, Cleveland and points west for the rest of our natural life. So long as supply exceeds demand; so long as capacity is greater than production needs; so long as some people think profits lie in production alone, regardless of all other factors, uneconomic competition seems likely to continue. But its effects can be minimized by constant preaching of the gospel of "profits first and volume second," and by emphasis on the importance of quality and the value of stable service year after year.

Automobile Dealers Become Oil Salesmen

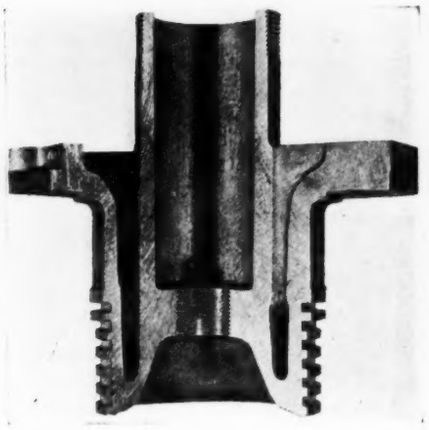
AN interesting tale is going the rounds of why automobile sales haven't been so good in one of New York's bustling up-State cities. About two years ago, the story runs, an enterprising oil company salesman arranged with the automobile dealers' association of this town that its members should distribute his brand of oil and gasoline exclusively. Special discounts were given to make the proposition attractive. Not long ago the dealers split a mellon which gave each one about $3,000 a year for the last two years. More than one of the dealers found the oil sales more profitable than selling cars under these particular conditions.

Better Sales in Wheat Sections in 1925

THE forty-eight crops reported by the Crop Report Board of the Department of Agriculture show an estimated increase in value of more than $753,000,000. This is an increase of 8.6 per cent over 1923 and 21 per cent over 1922. And the entire apparent gain was taken by the cereal raisers of whom the wheat growers profited most. The wheat growers, with their debts rapidly being liquidated, should be good buyers of automotive products in 1925. N. G. S.



Coupe on new Willys-Knight six chassis



Willys-Knight six cylinder head

Overland and Willys-Knight Add Six Cylinder Models

Larger of two new chassis has novel design of mechanical front wheel brakes and Skinner Oil Rectifier. Only coach and sedan bodies offered on smaller job. Both fours will be continued.

By Donald Blanchard

WILLYS-OVERLAND, INC., has broadened its market by the introduction of new Overland and Willys-Knight models with six-cylinder engines. The new Overland has an L-head engine with 3-in. bore and 4-in. stroke, and the Willys a 3¼ x 4¾-in. Knight power plant. The wheelbase lengths are 112¾ and 126 in. respectively. Balloon tires are furnished on both models, and the Knight six is equipped with mechanically operated four-wheel brakes, the Skinner oil rectifying system and a Staynew air cleaner.

Although no announcement concerning prices has been made, it is understood that the new models will sell at a figure which will enable ready competition in their respective fields , especially in view of the general performances of which they are said to be capable.

A unique feature of the Overland six line is that it consists of a coach and a sedan, no open bodies being offered on this chassis. The Knight six line is made up of roadster, phaeton, coupe, coupe-sedan, sedan and brougham.

Four-cylinder Overland and Knight models are continued without change except that the radiator and hood lines of the latter have been altered slightly to conform with the appearance of the new Knight six.

Knight Engine Develops 60 hp.

Piston displacement of the Knight six-cylinder engine is 236.4 cu. in. and it is said to develop 60 hp. at 2800 r.p.m. It differs from the Knight four in a number of important respects such as the cooling and lubrication systems, cylinder head construction and manifolding. It has a dynamically balanced crankshaft supported in seven Chadwick type, bronze-backed babbitt bearings of the following dimensions:

	Diameter	Length
Front	2½ in.	1 11/16 in.
Center	2½ in.	3 in.
Rear	2½ in.	2¾ in.
Intermediate	2½ in.	1 5/16 in.

The main bearing caps fit into recesses milled in the crankcase and are secured by studs.

How Engine Is Supported

This engine is supported at the rear by two arms projecting from the flywheel housing, which is integral with the crankcase, and at the front, by the timing chain cover. Both the oil pan and crankcase are aluminum and the latter casting is carried 2¾ in. below the center line of the crankshaft for stiffness. The oil pan has a false bottom in which there is a large screened opening through which the oil filters into the reservoir formed by the bottom of the pan. The cylinder block is a gray iron casting.

Tubular section steel connecting rods with a center to center length of 11½ in. are used. The big end bearings, 2⅛ x 1½ in., are babbitted in place and the piston pins, which are ⅞ in. in diameter, are locked in the upper ends of the rods and have their bearing in bronze bushings in the split skirt aluminum pistons. There are three plain rings and one oil type, all located above the pin.

Cooling water is circulated by a centrifugal pump housed in the front end of the cylinder block. The rotor is mounted on the rear end of the fan shaft which is supported by the pump body. To provide a tension adjustment on the fan belt, the pump body is piloted eccentrically in the block. The fan bearing is a Hyatt roller and its cage acts as a spacer between the stuffing box and its adjusting nut. The fan pulley is located centrally with

respect to the roller bearing and consequently the load on this bearing is entirely radial.

Cooling water enters and leaves the cylinder jackets on the right side passing into the water space over the cylinder heads which is inclosed by a cover attached in the same manner as in the Knight four. Positive flow of water around the combustion chamber walls is assured by a new design, submerged type cylinder head. The new heads are permanent mold, aluminum castings and are secured to the block by studs. As shown in the accompanying illustration, an annular water space is provided in them which is divided into right and left sections by vertical baffles. The two sections are connected by openings at the bottoms of the baffles. The tops of the baffles register closely with a longitudinal web on the inside of the cylinder cover, which divides the water space over the heads into right and left compartments.

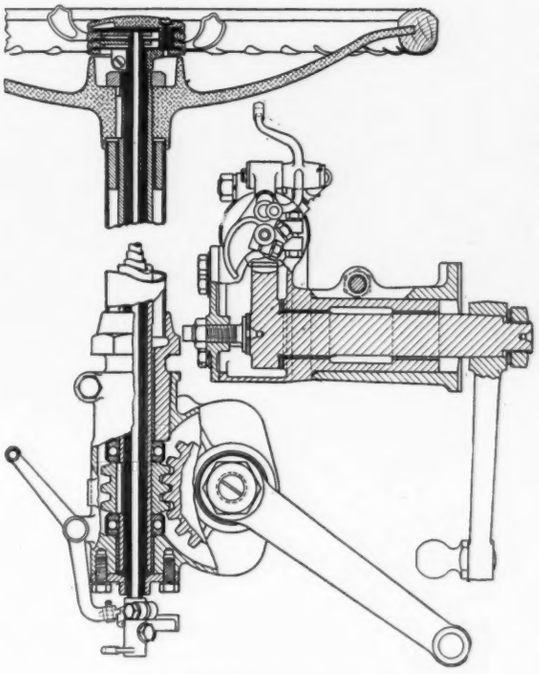
Water enters the right compartment from the cylinder block and is deflected downward into the aluminum heads by the web on the cylinder cover. It flows down the right sides of the cylinder heads, through the openings at the bottom of the baffles and then up on the left into the water space over the heads, thus giving a continuous flow of water past the walls of the combustion chambers. This method of cooling is said to be so efficient that the engine shows no knocking tendencies even under heavy load at low speeds despite the comparatively high compression ratio of 5 to 1. A thermostatic control valve is located in the water inlet pipe.

New Sealing Rings Employed

Sealing rings used in this engine are also a new design. Its inner surface is grooved and the lands thus formed fit into grooves on the lower end of the head casting. The tortuous passage at the back of the ring gives the efficient seal, and the many shoulders increase the bearing surface available for taking the thrust.

A Link-Belt chain with automatic spring idler drives the generator and the eccentric shaft. The latter is a drop forging supported in eight die-cast white metal bearings. The two center bearings on this shaft straddle the helical pinion which drives the oil pump and distributor.

The oil pump is supported from the center main bearing web. It is a gear type but differs from the conventional in that the pump shaft drives an internal gear which meshes with a pinion mounted eccentrically in the pump housing. The oil is distributed to each of the main bearings by a manifold supported from the bearing caps and



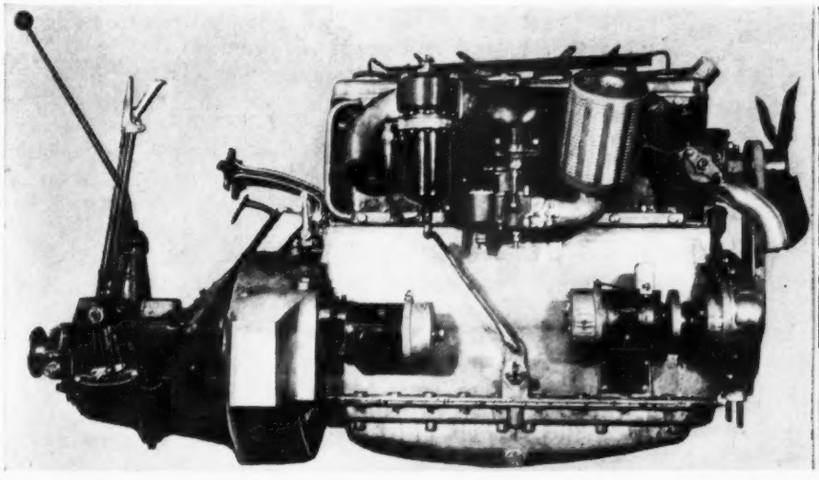
Willys-Knight six steering gear

passes to the crankpins through ducts drilled in the crankshaft. Oil under pressure also is supplied at the eccentric shaft bearings, the generator drive shaft bearing and the idler sprocket. The chain is lubricated by oil discharged through radial holes in the idler sprocket.

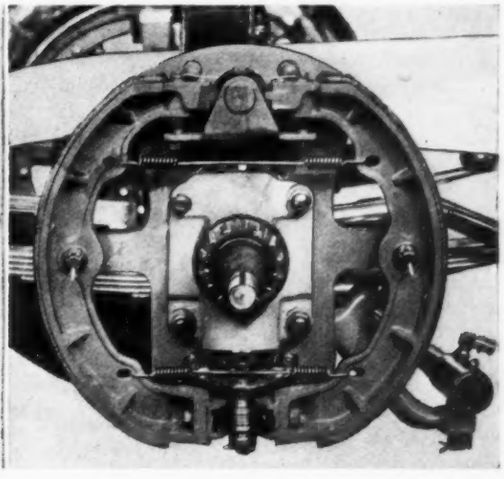
The oil rectifier is mounted on the exhaust manifold and draws oil off the pistons through small openings in the sleeves which register with each other in the same manner as the valve ports. The capacity of the system is eight quarts and the oil level in the crankcase is indicated by a bayonet type gage.

Gasoline is raised from the gasoline tank at the rear of the frame by a Stewart vacuum tank. The carbureter is a Tillotson and is bolted to the flanged opening of a hot-spot passage cord in the exhaust manifold. The mixture is carried to the cast aluminum intake on the left side of the engine through a cross-passage between No. 3 and 4 cylinders. A Staynew air cleaner as well as a Skinner oil rectifier is furnished on this engine.

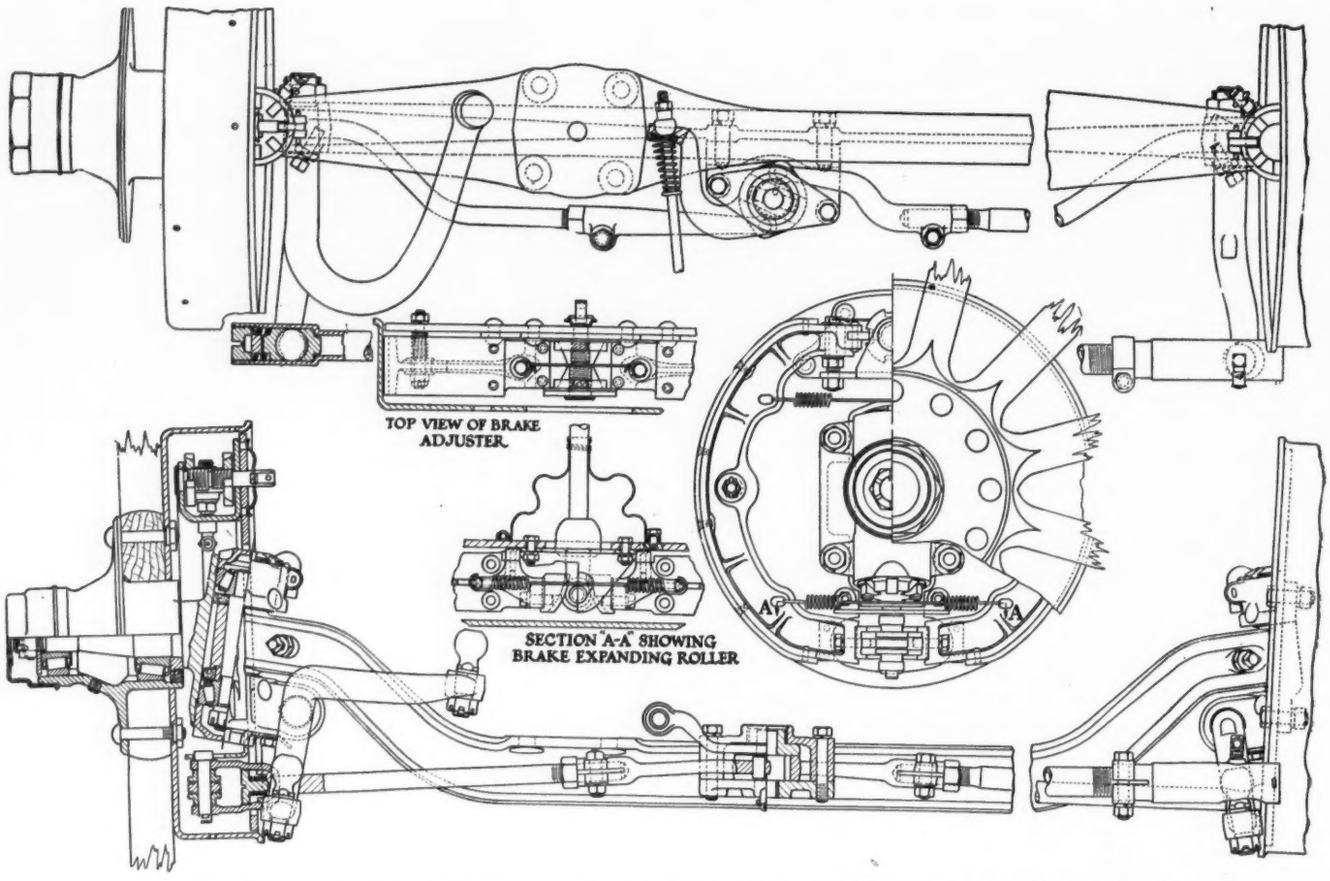
A six-volt, single-wire Auto-Lite system consisting of starting motor with Bendix pinion, third brush generator



New Willys-Knight engine, showing air filter and oil rectifier



Detail of Willys-Knight six brake



Front axle of new Willys-Knight six, showing the novel front-wheel brake operating mechanism

and semi-automatic distributor is standard equipment. The battery is a USL of 170 amp. hr. capacity which is unusually large considering the piston displacement of the engine.

Clutch and gearset are mounted as units to complete the power plant. Both of these units are similar to those used on the Knight four except that the clutch has 14 instead of 10 plates. The gearset ratios are: low, 3.215 to 1; second, 1.89 to 1; high, direct; and reverse, 4.133 to 1. The drive to the rear axle is through a ¾-in. tubular propeller shaft with oil tight Mechanics Machine universals at either end.

The rear axle is ¾ semi-floating, helical bevel unit with a 5.11 to 1 reduction, and is the same as the axle used in the Knight four except for dimensional differences. Rear axle torque and propulsion are taken through the rear springs which are 57⅛ in. long by 2¼ in. wide. The front springs are 36½ x 2¼ in. The frame side-rails are 7½ deep with 2-in. flanges and are pressed from 5/32 in. stock.

Front Wheel Brakes Radically Different

Front wheel brakes differ radically from any design in use in this country. The braking force is transmitted from the pedal by a rod leading to a lever supported by a bracket attached to the front axle.

This lever is mounted on a floating equalizer in the bracket. Pull rods extend from the equalizer to yokes carrying rollers located in the brakes proper. The yokes are fitted with ball joints to permit universal action necessary to steering and braking.

The front brakes are of the internal variety with two cast aluminum shoes anchored at the top. The operating rollers are located in wedge-shaped spaces formed by the curved lower ends of the shoes. When the brakes are applied, the rollers are drawn in toward the center of the front axle thus forcing the shoes outward into contact with the drums. The forces applied to each brake are equal, as, due to the action of the floating equalizer, one is a reaction of the other. A wedge adjustment manipulated by a screw is provided at the fixed ends of the shoes.

How Brake Connections Are Arranged

An equalizer mounted on the brake pedal divides the force applied to the brakes in the ratio of 40 to 60 front and rear respectively. At the lower end of the pedal there is a small bell crank, one arm of which has the front wheel brake rod pivoted to it. The other arm is pivoted to a curved lever which extends upward and connects to a second bell crank mounted on the pedal.

The other end of the latter bell crank is connected by rods to the rear brakes. The rear service brakes operate externally and do not differ from those used on the four-cylinder Knight. The hand brakes operate internally on the rear wheel drums and are of the same type used on the four.

The front axle is a reverse Elliott type with taper roller bearings at the upper and lower pivots. It is of the same design used in the Knight four except that the king pins are inclined transversely and the axle forging has been strengthened to withstand torsional stresses caused by the front wheel brakes. The steering gear is a worm and sector type with a reduction of 11½ to 1. Tires are 32 x 6.20 in., six-ply balloons on 5 in. rims.

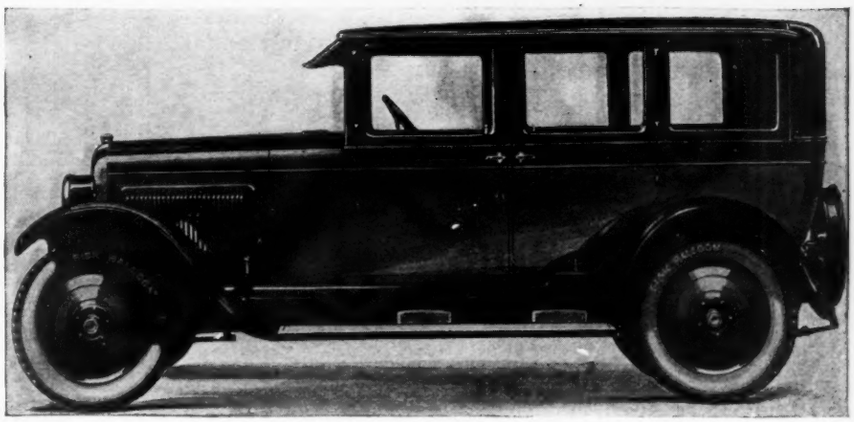
Turning to the new Overland chassis, its engine has a piston displacement of 169.6 cu. in. and its output is given as 40 hp. at 2600 r.p.m. The cylinder block and detachable head are gray iron castings. The crankcase is integral

with the former and extends 2 in. below the axis of the crankshaft. The oil pan is pressed steel.

The crankshaft is supported in three Chadwick type bearings of the following sizes:

	Diameter	Length
Front	1⅞ in.	1 13/16 in.
Center	1⅞ in.	2 13/16 in.
Rear	1⅞ in.	2½ in.

Connecting rods are I-section steel forgings. The big end bearings are babbitted in place and are 1⅞ in. in diameter and 1½ in. long. The piston pins, which are 47/64 in. in diameter, are clamped in the rods and have their bearing directly in the bosses of the split skirt, aluminum pistons. There are three plain rings, all above the pin.



Overland Six sedan

Camshaft and generator are driven by a train of three helical gears, the camshaft gear being of Textolite and the other two of steel. The camshaft is supported in four bearings all of which are die-cast white metal except the front which is cast iron. As in the Knight six, the two center bearings straddle the helical pinion driving the oil pump. In this engine, however, the driveshaft is horizontal and the pump is contained in a housing piloted and studded to the outside of the crankcase on the left. The distributor drive is taken from the rear end of the generator.

Lubricating System

Oil from the reservoir in the base of the crankcase is forced through a screen clamped to the end of the pump intake pipe. A tube leads from the pump to the rear main bearing, from which point oil is distributed through passages drilled in the crankshaft to the front and center main bearings, the crank pins and the timing gears. Camshaft bearings are lubricated by ducts in the webs connecting them to the main bearings.

Cooling water is circulated positively by a centrifugal pump mounted on the front of the cylinder block in much the same manner as in the Knight six. The fan bearing in this engine, however, is an annular ball. The water outlet from the engine is at the rear of the cylinder head. Ample water spaces are provided around all cylinder barrels and valve ports.

Valves have a clear diameter of 1⅛ in. and a lift of 5/16 in. They are operated through mushroom tappets which are assembled in groups of six in removable guide blocks. A pressed steel cover plate, held in place by wing nuts, incloses the valve compartment.

This engine is supported by two transverse steel plates, the ends of which bolt to brackets riveted to the frame side rails. The front supporting plate dowels over the No. 1 camshaft bearing and is held in place by the studs securing the timing gear cover. The rear end of the crankcase attaches to the other supporting plate.

The intake manifold is a straight, round section design with sharp right angle bends to assist in proper distributon of the fuel. It is supported centrally from the exhaust manifold and at its ends from the cylinder block. The heating jacket is cast integrally with it and the entrance to it registers with a companion opening in the exhaust manifold. The hot spot is located directly above the vertical riser from the carbureter.

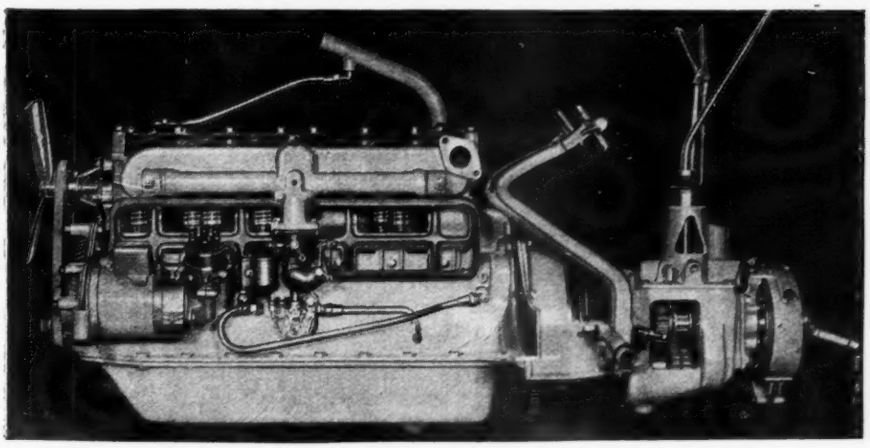
On leaving the manifold, the mixture travels through passages cored in the exhaust manifold which lead to the intake ports. The mixture does not, however, come in direct contact with the exhaust manifold while in these passages as they are lined with steel sleeves to minimize the heating at this point. The carbureter is a Tillotson and fuel is fed to it from the tank at the rear of the frame by the Stewart vacuum system.

Electrical equipment consists of Auto-Lite starter, third brush generator, semi-automatic distributor and 80 amp. hr. USL battery.

Overland Has New Rear Axle

Clutch and transmission are supported from the rear and of the engine by a bell housing cast integral with the gearbox. As in the Knight six, both units are similar in design to those used on the Knight four except that the clutch has eight plates. The drive to the rear axle is through two metallic universal joints and a 1¾ in. tubular propeller shaft.

The rear axle is a new Overland semi-floating design with helical bevel gears giving a reduction of 5.11 to 1. The differential housing consists of two malleable iron castings bolted together. The axle tubes are riveted to these castings. Pinion and shaft form an integral forging supported in a double-row ball bearing at the front and an annular ball at the rear. The former bearing is carried in a cage which is screwed and locked in the pinion shaft carrier. This construction simplifies the adjustment for pinion clearance. The differential is



New Overland six-cylinder engine

supported in roller bearings and can be adjusted transversely through openings in the rear of the differential housing which give access to the nuts securing the bearing cages. The outer ends of the axle shafts are supported in annular ball bearings.

Service brakes act externally on 12⅜ x 1⅞ in. drums on the rear wheels and the hand brake is a contracting type mounted on the rear end of the gearset. The springs are semi-elliptic front and rear, and rear axle torque and propulsion are taken through them. The spring lengths are 34¾ and 53 in. respectively. The steering gear is a worm and wheel unit similar in design to the one used on the Knight four.

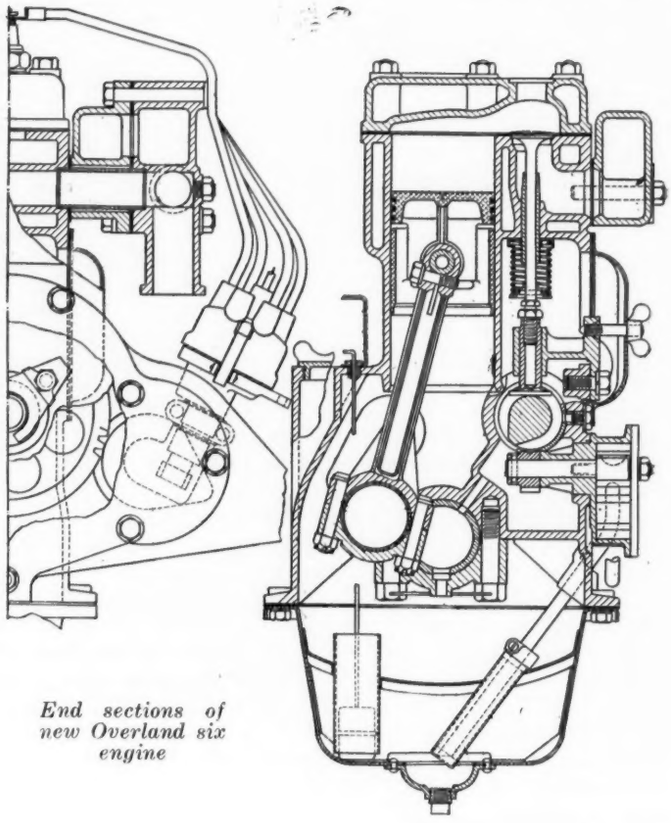
The front axle is an Elliot type with vertical king pins which are secured in the axle eyes. The pivot bearings are lubricated from cups mounted on the tops of the pins. The thrust is taken by washers. Frame side rails are pressed from 5/32 in. stock and have a depth and flange width of 4½ and 1¾ in. respectively. The tires are 31 x 5.25 in., six-ply balloons on 4½ in. rims.

Willys-Knight Lighting System

Adequate road lighting under all conditions without inconvenience to drivers of passing cars, has been provided on the Willys-Knight six in a novel manner.

Directly below the left headlamp, there is a spot light. Half of this lamp is shielded and it is aimed so that its rays fall on the right side of the road. When the lighting switch is turned to the dim position, the spotlight is thrown on automatically at the same time.

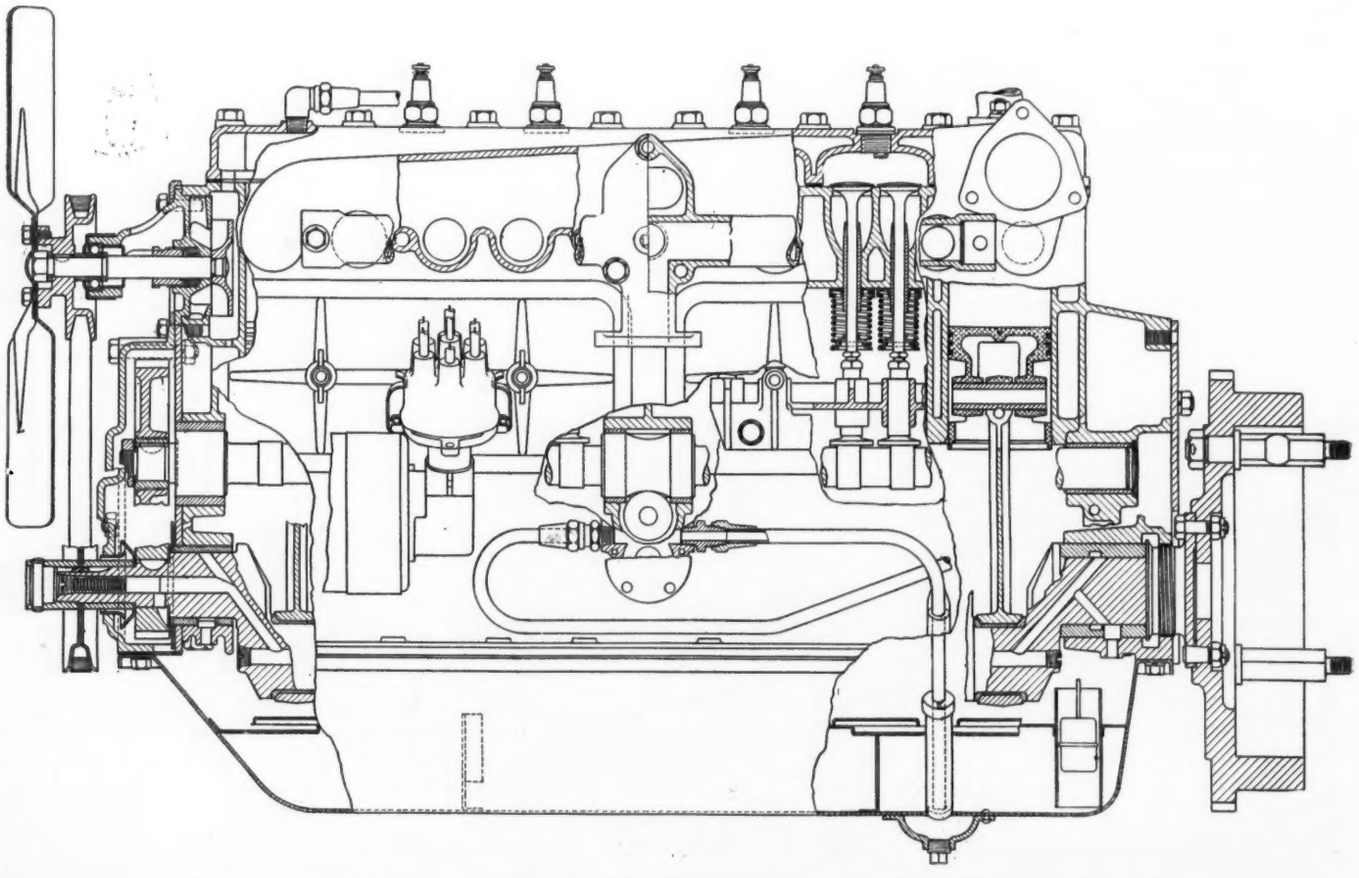
The lighting switch is located in a position convenient to the driver's right hand on the end of an arm mounted on the steering column. This arm also carries the horn button. In addition to the usual instruments and controls, the instrument board carries a clock and a gasoline gage. It is illuminated by a lamp concealed in the cowl. Watson



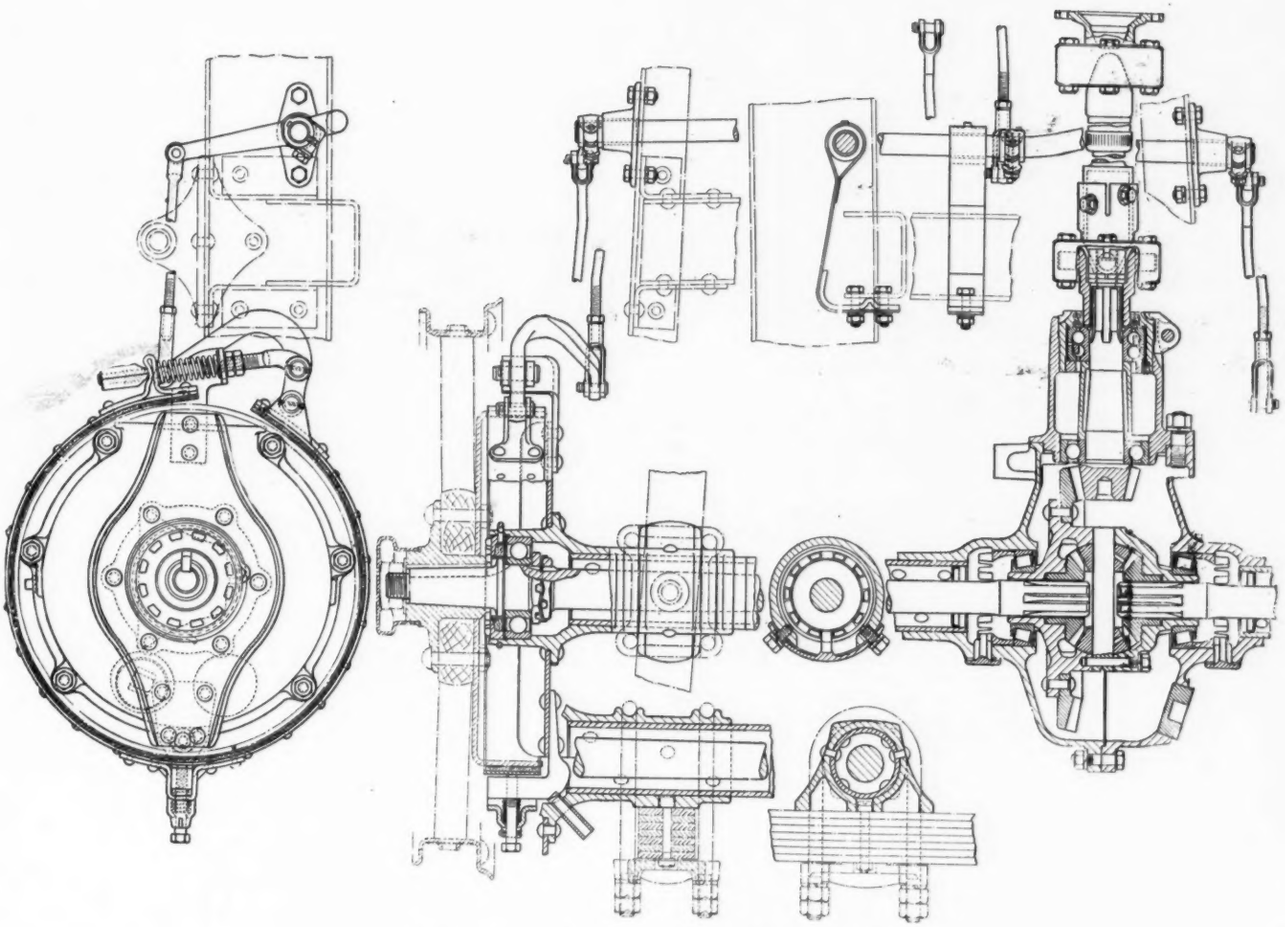
End sections of new Overland six engine

Stabilators, front and rear, are furnished on all models of the Knight six line.

Bodies on the Knight six chassis are finished in varying shades of gray. The phaeton and roadster are done in a two-tone combination with leather upholstery to match and



Sectional views of the new Overland 3 x 4 in. six-cylinder engine



Rear axle used in new Overland six chassis

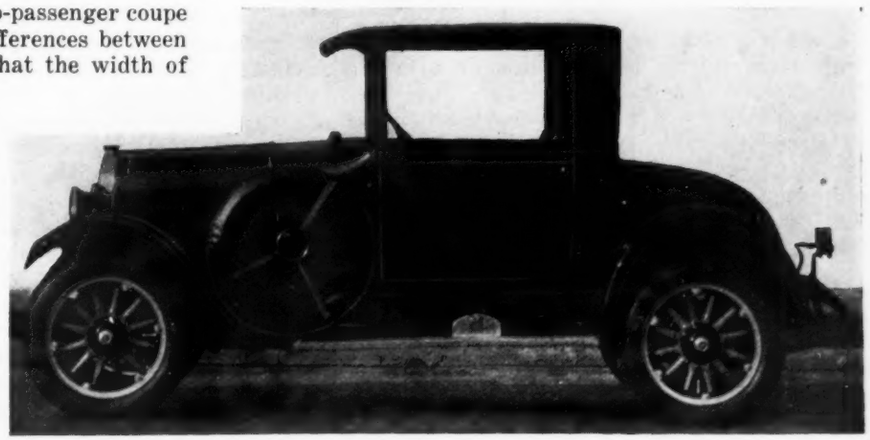
walnut finish wheel spokes and body moldings. The roadster has a permanent top and a rumble seat for two in the rear deck. Both open models are equipped with two-piece windshields, rear view mirrors, and windshield wipers.

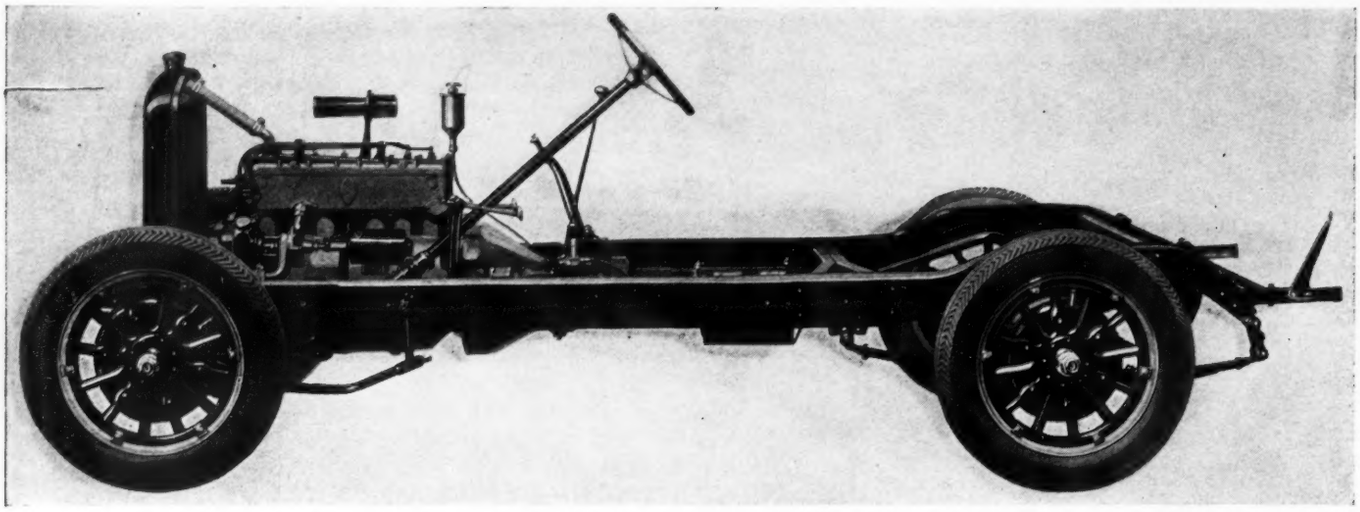
Sedan and brougham are also finished in two-tone gray, the panel formed by the double belt line bead molding being a darker shade. The tops are black and the wheels are finished to match the body color. Upholstery is velvet mohair and Marshall type springs are used in the seat cushions. These bodies are equipped with dome lamp, quarter lamps, foot lamp, heater, toilet case, rear vision mirror, one-piece windshield, and automatic wiper. The coupé and coupé-sedan are finished in Katahdin gray below the belt and black above. The former model has a large luggage space in the rear deck and the latter is equipped with a trunk.

On the Overland six chassis, the sedan is finished in peacock blue below the belt and dustproof gray above with velour upholstery in a harmonizing shade. The two-door sedan is a coach type. It is finished in black lacquer with gold striping. Rear quarters are Fabrikoid covered.

Two Passenger Coupe Offered as New Addition to Maxwell Line

MAXWELL has brought out a new two-passenger coupe priced at $1,025. The principal differences between the new model and its predecessor are that the width of the doors has been increased to 36 in. and the rear quarter windows have been eliminated. The finish is dark blue Duco and the upholstery is plum-colored leather. In addition to the large compartment in the rear deck, there is also space for parcels in back of the seat. The windshield is a one-piece design. Equipment consists of 5.77 in. balloon tires on natural finish wood wheels, nickeled radiator shell, cowl lamps, spotlight, rear view mirror, scuff-plates, tire carrier on left running board and sun visor integral with roof.





Left side of new Jewett chassis, showing redesigned engine and new axles equipped with Lockheed brakes on all wheels

Jewett Has New Engine, Axles and Bodies Paige Is Changed but Little

Powerplant improvements include skeleton pistons, chain drive, redesigned manifolds and balanced crankshaft with larger bearings. 4 Lockheed brakes extra.

A PRACTICALLY new engine and a completely redesigned line of bodies are the outstanding features of the Jewett Six for 1925. All models are equipped regularly with 31 x 5.25 in. balloon tires, and Lockheed hydraulic four-wheel external brakes are offered at an additional cost of $40. The line consists of the same seven body models as in 1924 and no changes have been made in the prices except on the standard phaeton, which has been increased from $1,135 to $1,175.

Balloon tires and de luxe accessory equipment are furnished as regular equipment on the entire Paige 1925 line and are included in the list prices, which are $70 higher than in 1924. No changes have been made in the body lines and the chassis remains substantially the same except for a few minor changes. Lockheed hydraulic four-wheel contracting brakes are offered at an additional cost of $45.

Although the bore and stroke of the Jewett engine remain 3¼ and 5 in. respectively, changes made in the engine are said to have resulted in a largely increased output. Smoother performance has been obtained through the use of a counter-balanced crankshaft which is placed in dynamic balance. The new shaft is also stiffer than the old, the diameters of its main journals and crankpins having been increased from 2⅛ to 2⅜ in. The three main bearings are now of the Chadwick type, which simplifies maintenance, as no fitting is necessary when a replacement is made.

Skeleton cast iron pistons have replaced the solid type used formerly. The new design is said to permit of fitting the pistons with 0.002 in. clearance, as compared with 0.003 to 0.0035 in. required with the former design, and also to facilitate lubrication of the cylinder walls. The piston pin now is clamped in the rod and has its bearing in the piston bosses. Formerly the pin was secured in the piston and had its bearing in the rod.

A Link Belt with automatic spring idler to maintain its tension has replaced the metallic timing gears used previously. As a result of this change, the distributor, water pump and generator have been transferred to the left side of the engine. With the new layout, the engine is obviously much more accessible, as there is nothing on the valve side but the carbureter.

Cooling System Enlarged

Capacity of the Jewett cooling system is somewhat larger, due to the fact that the radiator is 1 in. higher, while the diameters of the outlet and inlet connections also have been increased. Stuffing boxes on the pump shaft have been enlarged. The cooling fan is driven from a pulley mounted on an extension on the front end of the pump shaft. The generator is strapped in a saddle cast on the side of the crankcase and is driven from the rear end of the pump shaft through a flexible hose coupling which has replaced the spring of square section steel formerly used for this purpose.

Pressure lubrication now is provided at the cam and pump shaft bearings. The vane type oil pump used in 1924 has been displaced by a gear pump which is driven off the pump shaft by helical gears which also drive the distributor. Oil first passes through the pressure relief valve, which is mounted on the side of the crankcase below the water pump, and thence through tubing to each of the main bearings, from which ducts drilled in the crankcase webs lead to the camshaft bearings. The oil pump is located in the crankcase and there is no external oil piping on the engine.

Manifolding has been redesigned entirely. Formerly

the carbureter was mounted on the left side of the engine and connected with the intake manifold on the right side by a horizontal passage cored in the block. Now it bolts directly to a short riser leading into the intake manifold. The hot spot is located on this riser and some additional heat is applied on the horizontal portions of the manifold. The section of the intake manifold is practically rectangular. The Stewart vacuum system is again regular equipment.

A worm and sector steering gear with a larger reduction to give the added leverage needed with balloon tires now is used on the Jewett instead of the worm and wheel type used formerly.

Front and rear axles of both Paige and Jewett chassis are of the same general design used in 1924, but now are made by the Salisbury Axle Co. With four-wheel brakes a special front axle is furnished. This unit differs from the standard in that the king pins are inclined transversely and the axle forging is heavier to withstand the torsional braking stresses. The four-wheel brake installation follows conventional Lockheed practice except that the rubber tubes lead to fittings on the axles which are connected by copper tubing to the cylinders.

New Jewett bodies do not differ radically in general appearance from the 1924 line. The radiator is higher and the contour of its top curve has been altered. The length of the car is accentuated by lower running boards and by a belt line molding which is carried forward to the radiator shell. Closed models also have a second molding around the bases of their superstructures.

All Jewett models are finished in lacquer, the colors being cobalt blue on the standard jobs, beige brown on the le duxe phaeton, and bronze green on the de luxe sedan and brougham. Flush type cowl ventilators are provided on the entire line. One-piece windshields are used and on the closed models they can be raised 1 in. vertically and then swung outward if desired. In the standard sedan and brougham the upholstery is Chase millaise and in the de luxe closed models Chase mohair velvet. The framework of the bodies has been strengthened by the use of a better grade of hardwood, larger pillars and heavier metal fittings.

The 1925 Paige line is priced as follows:

4-pass. phaeton	$2,165
7-pass. phaeton	2,165
5-pass. brougham	2,395
7-pass. sedan	2,840
7-pass. suburban limousine	2,965

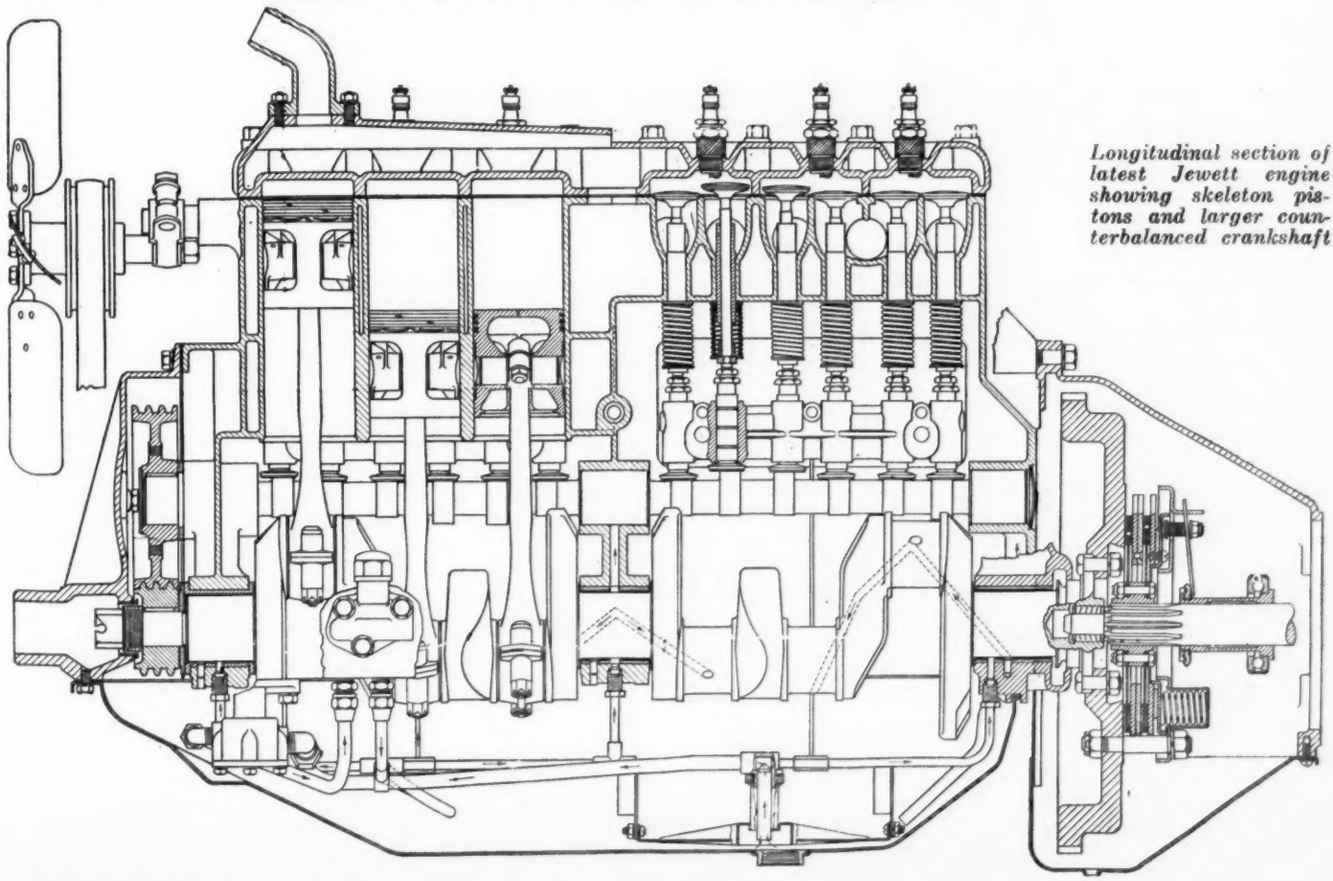
Changes in the Paige powerplant include a larger water pump, thermostat and cooling fan. The plain fan bearing formerly used has been replaced with an annular ball type, and the radiator core is thicker. Exhaust valves have been changed to Silcrome, a flexible hose replaces the generator spring couplings, and a gear oil pump is used instead of the vane type employed in 1924. The Stewart vacuum system is again regular equipment.

Steering Gear Reduction Increased

Reduction of the steering gear has been increased and it now is of the worm and sector type instead of worm and wheel. Front and rear springs have been redesigned for the new tire equipment. The tire size is 33 x 6.75 in.

Equipment on Paige models includes front bumper, rear fender guards, spare tire, nickel radiator, Motometer, combination stop and tail lamp, automatic windshield wiper, and rear view mirror. Open models have cowl lights and the sedan and suburban limousine have dome, quarter, and automatic step lights. The latter model also has a concealed speaking tube. Hartford shock absorbers are equipment on the brougham and Gabriel snubbers on all other models.

In the closed Paige bodies, the upholstery is mohair, except in the front compartment of the suburban limousine, which is trimmed in leather. Phaetons are upholstered in leather.



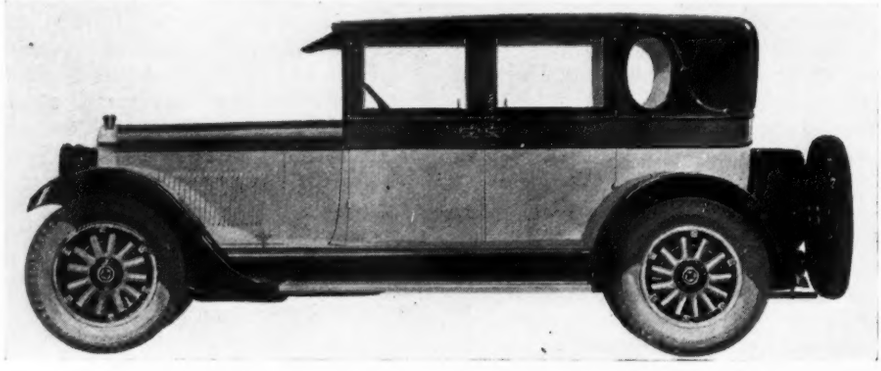
Longitudinal section of latest Jewett engine showing skeleton pistons and larger counterbalanced crankshaft

Displacement of Rickenbacker Six Is Increased—Eight Unchanged

Design of both chassis now quite similar. Many parts are interchangeable. Prices on sport phaeton, coupe and sedan are reduced $200. New $1,595 "coach-brougham" added.

RICKENBACKER'S six-cylinder line is continued for 1925 with a larger and materially improved engine. Prices on the sport phaeton, coupe and sedan have been reduced $200 and a new four-door, five-passenger coach-brougham, priced at $1,595, has been added. The price on the roadster remains at $1,595, but in the future it will be built only on order. A coach-brougham listing at $2,395 has also been added to the Vertical Eight line, which otherwise is continued without change. Balloon tires are standard equipment on the six and optional at no extra cost on the eight.

As a result of the changes made in the six, its design conforms very closely to the eight, and many of the parts in the two engines now are interchangeable. The latter fact obviously tends toward more economical manufacture and also reduces factory and dealer service costs. The extent to which interchangeability has been carried is indicated by the fact that such parts and assemblies of the six as the main bearings, connecting rods, oil pump, fan bracket, flywheels, valves, tappets, valve springs, timing chain compartment cover, and flywheel housing, are now exactly the same as in the eight.



New Rickenbacker five-passenger "coach-brougham" on six chassis
Rickenbacker's latest six-cylinder chassis, termed Series D

Piston displacement of the engine has been raised from 218.6 to 236.4 cu. in. by an increase in the cylinder diameter from 3⅛ to 3¼ in., with the result that the car now is said to be able practically to duplicate the acceleration of the eight, factory tests having shown a high-gear pick-up from 5 to 25 m.p.h. in less than 7 seconds.

Seven Bearing Crankshaft Used

The new engine is also said to operate more smoothly at all speeds, due partly to the change from a three-bearing crankshaft to a dynamically balanced, seven-bearing design. In addition, the new shaft is considerably stronger than the old because of an increase in the diameters of the main journals and crankpins to 2 9/16 and 2 in. respectively. Another factor contributing to smoothness is the greater accuracy with which the combustion chambers are machined, the surfaces now being profiled as in the eight-cylinder engine.

Camshaft lubrication of the six is effected in the same manner as in the eight. The shaft is supported in six bearings in a longitudinal compartment which is maintained full of oil by overflow from the pressure relief valve and by splash from the crankcase. The inner wall of this compartment is of such height that the camshaft operates continuously in a bath of oil. Excess oil spills over the inner wall of the compartment and drains back to the crankcase.

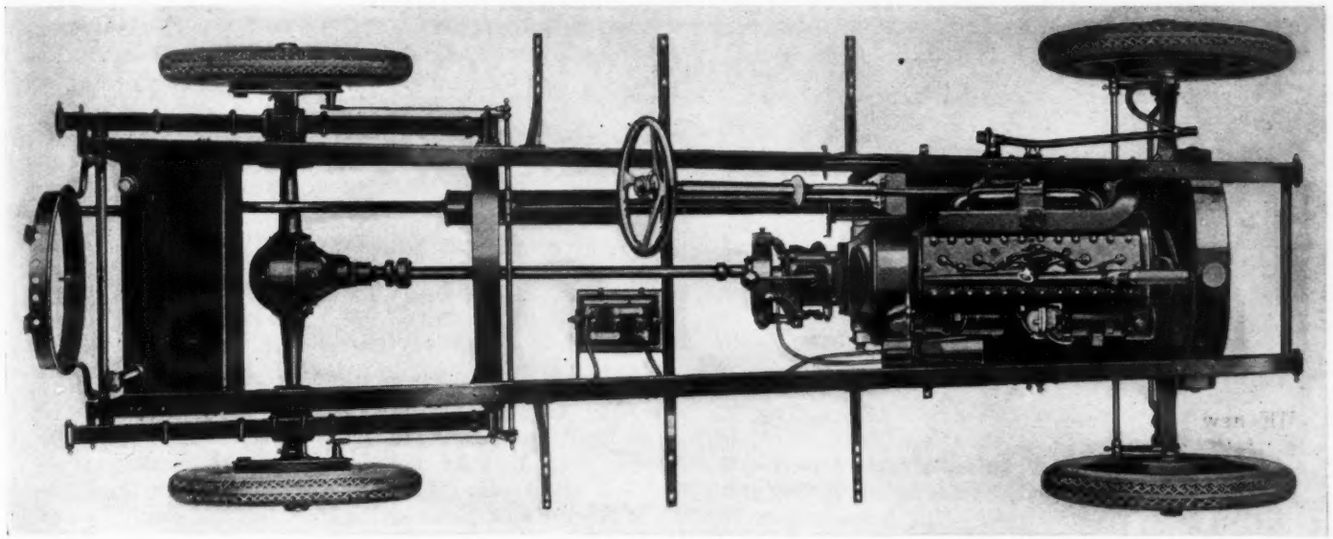
The outer wall of this compartment is formed by a large cover plate, the removal of which exposes the entire valve operating mechanism. Hand holes are provided in this plate, so that it is not necessary to drain the oil from the camshaft compartment to make tappet adjustments. The covers over these holes are readily removable, as they are held in place by thumbscrews.

Valves in the six now are inclined at an angle of 3 deg. to the cylinder bores, as in the eight. The piston pins are clamped in the rods. They are 1 in. in diameter and have their bearing in plain bronze bushings in the piston bosses. The cast iron pistons are 4¼ in. high and have three rings above the pin and an oil ring below. The main bearings are now of the flange type, as in the eight-cylinder engine. Connecting rods are machined all over and are checked carefully for uniform weight.

Over-all length of the engine has been reduced 7⅝ in. by eliminating the extra bearing on the front end of the crankshaft which was provided to support the flywheel. A change has been made in the front engine support and it is now exactly the same as in the eight. The bracket supporting the fan is also the same as in the larger engine. Cylinder barrels are honed after grinding and are held truly cylindrical within 0.0005 in.

A new design of centrifugal water pump, the details of which are shown in the accompanying illustration, has been adopted on the six. As in the past, the pump is driven from the rear end of the generator. To provide for relative motion between it and the block, a novel flexible connection in the form of a bellows with integral flanges on each end for attachment is installed.

Manifolds on the six have been redesigned and now are similar to those on the eight. The hot spot is



Rickenbacker's latest six-cylinder chassis, termed Series D, which bears a close resemblance to the eight-cylinder model, especially in respect to the power plant

formed by a chamber surrounding the center of the intake manifold and connecting with the exhaust manifold. When the engine is started this chamber quickly fills with hot gases and the mixture receives maximum heat. The entrance to this chamber is at the bottom and there is no outlet. Consequently the gases trapped in it reduce the rate of heating after the engine has warmed up, which is a desirable condition.

No Changes in Chassis Proper

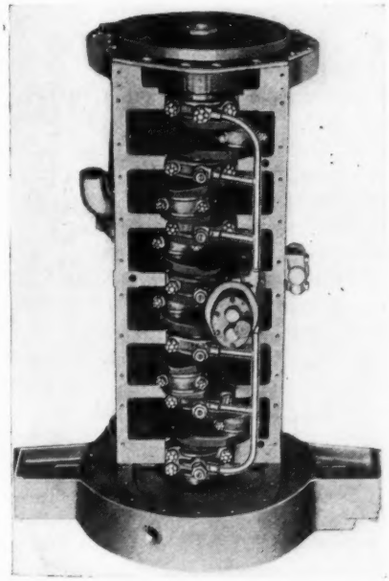
No changes have been made in the chassis except an increase in the steering gear ratio to give easier steering with balloon tires. On the six the tire size is 31 x 5.25 in. and on the eight either 32 x 5.77 in. balloons or 33 x 4½ in. high-pressure cords. Natural finish wood wheels are furnished on all models of the six-cylinder line except the coupe and sedan, which are equipped with steel disk wheels as are the eight-cylinder models.

An option of either Duco or varnish is offered on all models except the coach-broughams, on which lacquer finish is standard. The six bodies all are done in the popular two-tone color scheme, with the darkest shade covering the top of the hood and forming a belt line panel extending clear around the bodies. Superstructures are black. The colors used on bodies are maroon on the phaeton, blue on the coupe and sedan, and green on the coach-brougham.

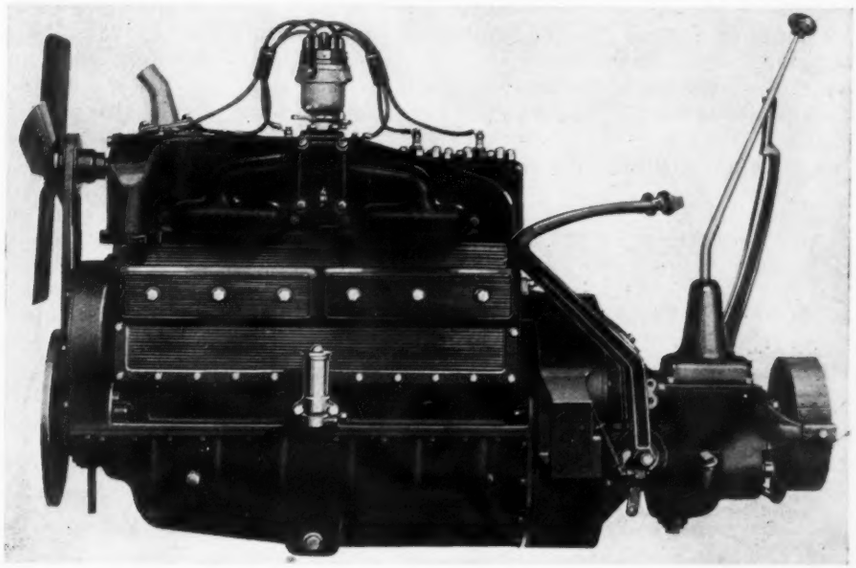
The coach-broughams are comfortable five-passenger, four-door closed bodies. Rear quarters are covered with leather and have vertical elliptical windows and ornamental landau joints. Space is provided at the rear for a trunk, which is included in the equipment of the eight. The upholstery is tan worsted in a shade to match the exterior finish.

Equipment on Coach Brougham

Equipment on the eight coach-brougham includes front bumper, rear fender guards, Hartford shock absorbers front and rear, clock, motometer, wing radiator cap and lock, stop light, vanity cases, automatic windshield wiper, rearview mirror, sun visor and disk wheels. The finish on this model is two-tone blue Duco.



Underside of crankcase on Rickenbacker seven-bearing six



Latest Rickenbacker six, which closely resembles the eight in general design

New Wills Sainte Claire Six Has Overhead Valves and Overhead Camshaft

Engine has 3¼ in. bore and 5½ in. stroke with four point suspension on a 128 in. wheelbase chassis. Eight body models in new line resemble body and hood lines of the present eight.

THE new Wills Sainte Claire Six, which is making its initial appearance at the New York Show, is featured by an overhead valve, overhead camshaft engine with a 3¼ in. bore and 5½ in. stroke, giving it a piston displacement of 273 cu. in. The line consists of roadster, Gray Goose Traveler (a five-passenger phaeton), seven-passenger phaeton, four-passenger coupe, four-door brougham, five-passenger sedan, seven-passenger sedan, and inclosed drive limousine, all of which are mounted on a standard 128-in. wheelbase chassis. The new model is in addition to the present eight-cylinder line, which is continued with new and more luxurious bodies. No announcement concerning prices on either line has been made.

From the standpoint of appearance the new cars resemble the eight, the wheelbases being identical and the body and hood lines substantially the same. The two chassis are also very similar except, of course, for the power plants, although many of the features of the eight, such as the method of valve actuation, the camshaft steadying device and the fan drive, are found in the six-cylinder engine.

The new engine presents an unusually smooth and clean appearance. It is suspended at four points, rubber cushioning blocks being provided at the two front supports. The cylinder block, upper crankcase and upper portion of the flywheel housing form a single gray iron casting. The four engine supporting arms are integral with this casting, the two at the rear extending out from the flywheel housing. The starting motor has a sleeve mounting on the left side of this housing.

The lower portion of the flywheel housing and the lower crankcase form an integral aluminum casting. This part is bolted to the upper crankcase, the joint between the two coming at the level of the crankshaft axis. The crankcase is pressed steel and is secured to the lower crankcase by studs.

The detachable cylinder head and the housing for the overhead valves are also gray iron castings. The cylinder head hold-down studs are seated in the head and extend down through holes drilled in the water jacket walls of the block. Recesses are provided in the block walls to give clearance for the nuts on the ends of these studs. The advantage of this construction is that, when these nuts are tightened the strain is on the water jacket wall and not on the cylinder wall, where it would tend to cause objectionable distortion of the barrels.

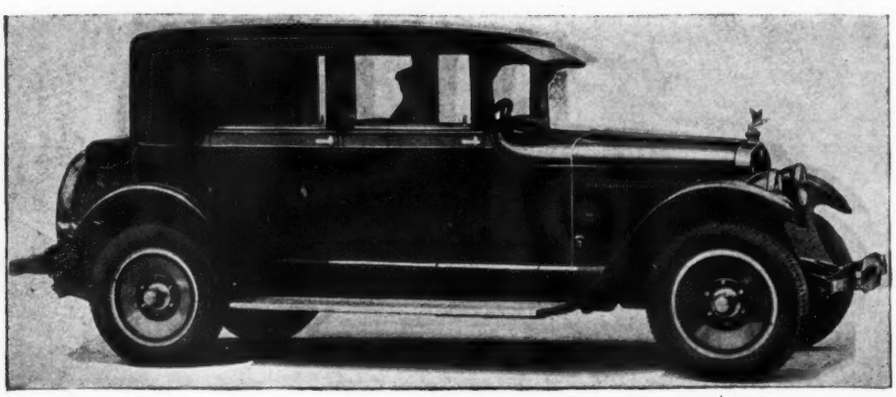
The combustion chambers are completely machined and are contained entirely in the head casting, the top of the piston being level with the split in the head at the upper dead center position. With this design the cylinder barrels are not exposed to the high temperatures existing during combustion, and consequently the possibility of their being distorted out of round by unequal expansion is reduced.

Seven Bearing Crankshaft

Seven bronze-backed, babbitt-lined, shimless type bearings support the crankshaft, which is a very heavy forging, its weight being about 77 lb. It is machined all over and put in static and dynamic balance. The connecting rods are of aluminum alloy with babbitt bearings at their big ends. Pistons are cast iron, with two plain rings above the pin and an oil ring below, the base of the groove for the latter ring having oil relief holes.

The overhead camshaft is carried in four main bearings which are supported in the cast valve housing. The thrust is taken at the front bearing by washers. On the rear of the camshaft there is a friction steadying device of the same type used in the eight. The camshaft drive is through helical bevel gears from the front end of the crankshaft to an inclosed vertical shaft at the front of the engine and thence through a second set of helical bevel gears to the camshaft. The vertical shaft is in two pieces, connected by an Oldham coupling which can be put together only in one way, thus avoiding the necessity of retiming the valves when the head is removed for maintenance work. The lower portion of this shaft is carried in two bronze bushings, mounted in a cast housing which is studded and piloted to the upper crankcase. The upper portion is mounted in two bronze bushings supported by the overhead valve housing. Thrust is taken by washers.

The valves are arranged vertically along the center line of the cylinder block. Valve stem guides are of cast iron pressed into the head casting, and the valve spring retainer is secured with a split washer. The actuation of the valves is through rocker arms in the same manner as in the eight-cylin-



Body and hood lines on the new six closely resemble those of the Wills Sainte Claire eight

der engine. The rockers are bronze-bushed and are carried by lapped shafts supported from cover plates on the right side of the valve housing. When these plates are removed, the tappet assemblies come with them. To make valve clearance adjustments the two cover plates on the left side of the valve housing are removed.

Cooling water is circulated by thermo-siphon. A novel feature of the circulating system is that the water enters the right front engine supporting arm and travels the length of the engine through a cored passage in the upper crankcase, entering the water jacket at the rear. An advantage advanced for this construction is that it provides cooling for the oil in the crankcase. Each cylinder barrel is entirely surrounded by water and the same is true of the valve ports. The water outlet is on the left side of the head at the front. The fan is of die-cast aluminum and is a three-bladed design with airplane propeller type blades. It is driven through helical gears from the vertical shaft at the front of the engine and is provided with the same type of automatic governing mechanism used on the eight. This device cuts out the fan drive at about 35 m.p.h. in high gear.

How Carbureter Is Attached

The carbureter bolts to a flange on a cast aluminum, water jacketed manifold, which is secured to the head by studs. This manifold covers two rectangular openings in the head casting which lead to a distribution manifold cored in the head. This manifold has a substantially square section and is surrounded by water. The exhaust manifold is a ribbed casting which is secured to the right side of the head by studs. The hand throttle is on the steering column. The distributor is of the full automatic type.

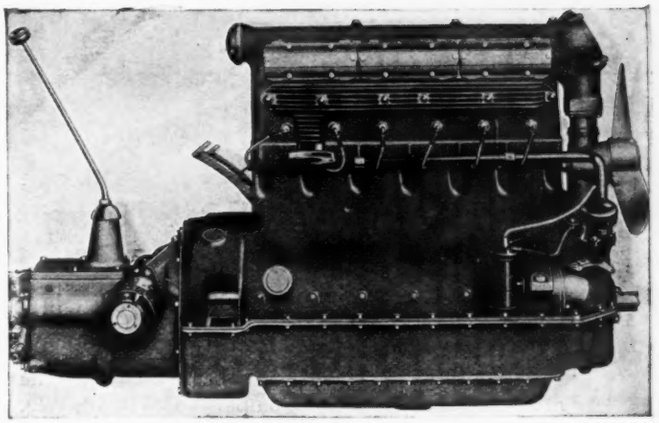
The gear oil pump is driven from the lower end of the distributor shaft, which, in turn, is driven from the front end of the crankshaft through helical gears. The pump draws its supply from the lowest point in the crankcase, the oil passing through a wire screen before entering the pump. From the pump the oil passes through a relief valve and thence through tubing to each main bearing, from which points it is distributed to the crankpins through the drilled crankshaft. The overhead valve mechanism is supplied with oil through a vertical duct drilled through the cylinder block, head and valve casting. This duct discharges at the front camshaft bearing, where the oil enters the hollow camshaft and is delivered to each cam and bearing through radial drilled holes. Surplus oil returns to the crankcase through a vertical duct at the rear of the engine. A bayonet type oil gage is provided for measuring the depth of oil in the crankcase.

Flywheel Housing Supports Clutch and Transmission

Clutch and three-speed transmission are supported from the flywheel housing. The bell housing is a separate casting and has the generator mounted on its right side. The drive for this unit is through helical bevel gears from the clutch gear shaft. The clutch is a dry plate type with woven asbestos facing on the driven disk and differs only in detail from the unit used on the eight. The clutch pilot is a plain bearing and the throwout an annular ball.

Anti-friction bearings are used throughout the transmission. The clutch gear bearing is an annular ball type, as is the bearing at the rear end of the countershaft. The speedometer drive is through helical gears from the hub of the universal joint companion flange.

Front and rear axles are the same as used on the eight. The former is a reverse Elliott design with transversely



Showing the clean lines of the left side of the Wills Sainte Claire engine

inclined king pins to give center point steering. Thrust washers are used at the pivots and the wheel bearings are taper rollers. The rear axle is a semi-floating, helical bevel design. The pinion shaft mounting is of the outboard type and the cages of the two Timken bearings supporting it are mounted in a sleeve for convenience of adjustment. Timken roller bearings also support the differential and the outer ends of the axle shafts, which latter are removable endwise. Hydraulic four-wheel external service brakes are regular equipment. The emergency brake is located at the rear of the transmission and is operated by a hand lever located at the left of the driver just forward of the door.

The steering gear is a worm and wheel type of Wills design. Ball bearings are provided at each end of the worm, and plain bearings on the steering gear shaft. Both worm and wheel are adjustable, the adjustment on the latter being of the eccentric type. All joints in the steering linkages are of the ball type.

Springs are semi-elliptic front and rear. The latter take the rear axle thrust and torque. The frame side rails are of channel section and there are three pressed steel cross-members and two tubular braces to resist weaving. Regular tire and wheel equipment consists of 33 x 6 balloon tires on steel disk wheels.

Standard finishes on the bodies are as follows: Roadster, gray; Gray Goose Traveler, sage brush green; brougham, limousine blue; five-passenger sedan, moleskin; seven-passenger sedan and limousine, Brewster green light; seven-passenger phaeton, green gray. The hardware in the closed models has a hammered silver finish and the upholstery is broadcloth. The body frameworks are of ash and the panels are aluminum.

A NEW development consisting of a two-focal point reflector working in conjunction with a specially designed lens called Guide Ray is said to provide glareless driving. Perfected and used by the Guide Motor Lamp Manufacturing Company, Cleveland, Ohio, they claim that their headlamps are not only glareless, but produce a powerful blanket of light at a distance of 200 feet. Beam is widespread and is guaranteed by the manufacturer not only to be glareless but legal, when properly focused and adjusted. The average test values exceed the specifications set down by the Society of Automotive Engineers.

The glare annoyance has been eliminated by the special design of the reflector. The lens merely spreads the light in predetermined amounts, thus allowing the maximum amount of light for road illumination.

Kissel Adds Straight Eight Models to its Line Both Cadillac and Dodge Add a Coach

Headliner of the Kissel eight-in-line will be new four-door de luxe brougham sedan. Cadillac coach is finished in green Duco with striping to match, Dodge in lacquer.

A "STRAIGHT EIGHT" model has been added to the line of the Kissel Motor Car Company, Hartford, Wis. Aside from the engine, it embodies most of the engineering features of the six cylinder model, and it is furnished in the same body styles as the six, with the exception of the low-priced brougham, which on the six is sold at the open car price. Balloon tires (33 by 6 in.) and hydraulic four wheel brakes are standard on the eight as well as the six. Tests have shown that 75 m.p.h. is possible with the new eight. Good acceleration, plenty of power on hills and freedom from vibration are other qualities claimed by the Kissel Company for the car.

The headliner of the straight eight line will be the new four door De Luxe brougham sedan. This model has unusually wide (32-inch) doors, facilitating ingress and egress, and the window corners are rounded instead of being square. With its long hood and cowl and low hung frame, it has a rakish appearance, while the well rounded corners and graceful sweep of its body lines are carried out even to the trunk on the rear. The fabric rear quarter is ornamented by a landau bow.

Many features of the eight-cylinder engine are identical with those of the six, including the extra large aluminum oil basin, Lynite rods and pistons, full pressure oil feed to all bearings and front end silent chain drive, Kissel's thermostatic head and by-pass, and other features. The eight has a 3 3/16 in. bore, 4½ in. stroke and 287 cu. in. displacement. At 2400 r.p.m. it develops 62½ horsepower. The cylinders are cast in block and are of the "L" head type, with valves on the left side.

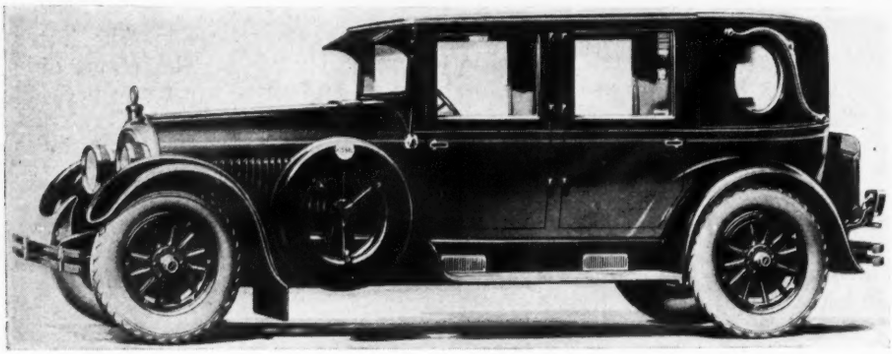
All the models, with the exception of the berline-sedan, have a 126-in. wheelbase, that of the model mentioned being 137-in. Both the six and the eight have the Ross variable ratio cam and lever steering gear and Link Belt silent chain front end drive, two new features.

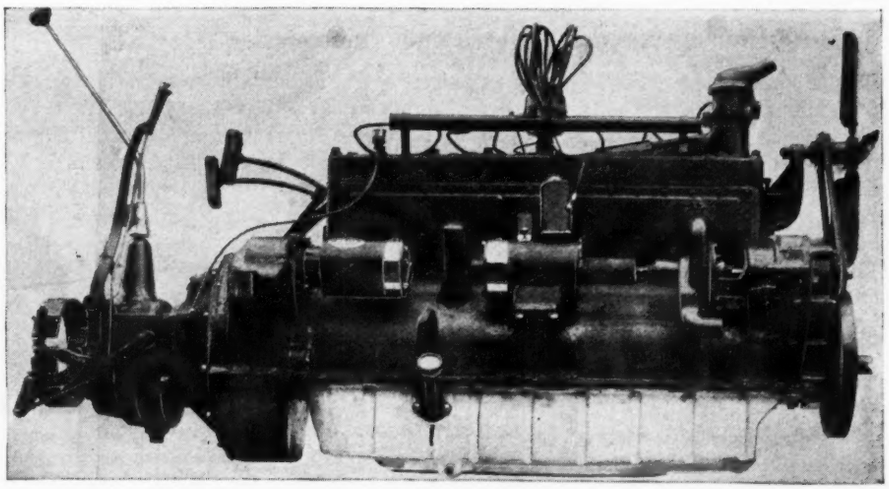
The cylinders are honed after boring and grinding. Force feed oiling is used to the main bearings, connecting rod bearings, camshaft bearings, and front end drive. The oil pressure varies all the way from 25 to 100 pounds.

Lynite connecting rods and pistons are used, and it is figured that by the use of these light alloys the reciprocating weight per cylinder is cut down 1¾ lbs. The pistons are fitted with the Teetor "oil-proof" rings, the lower ring having a groove which permits the use of a large amount of oil but prevents it from going past the pistons. The upper three rings have an oil recess each, to keep the oil on the cylinder walls. The piston pins are locked tight in the connecting rods, making the bearing in the piston itself.

The oil basin is made of aluminum and is quite deep. This permits two machined surfaces for a good gasket fit and is claimed to prevent oil leakage. The connecting rod bearings are spun right into the rods, to eliminate all danger of a bearing not being seated properly, and the bearings are then machined, broached, and burnished to fit.

The straight eight is also equipped





Above — Brougham sedan with doors 32 in. wide. Right—Eight-cylinder engine with extra large aluminum oil basin, Lynite rods and pistons and front end chain drive

with an automatic chassis lubrication system under Dawson patents. A substantial reserve supply of lubricant is carried, and grease is fed into the bearings under constant pressure and without waste. The car can be driven for several hundred miles with one filling. Filling the oilers is said to be a matter of a few minutes. As the piston is forced outward, the reservoir fills, and as the piston then drops gradually, the reservoir empties, thus forming an accurate gage of the reserve supply of grease, which may be determined at a glance, thus removing the danger of the system unexpectedly running dry.

The headliner of the six line is a new low-priced five passenger brougham with two 30 in. doors and the corners of all windows rounded. The car is low hung and rakish in appearance and the body lines are gracefully curved. The rear quarter of fabric is ornamented by a landau bow.

The interior is upholstered in Chase mohair in a combination striped and plain effect. There are two full size folding front seats and a full width back seat capable of seating three people comfortably without crowding. All four windows may be raised or lowered by rotary regulators.

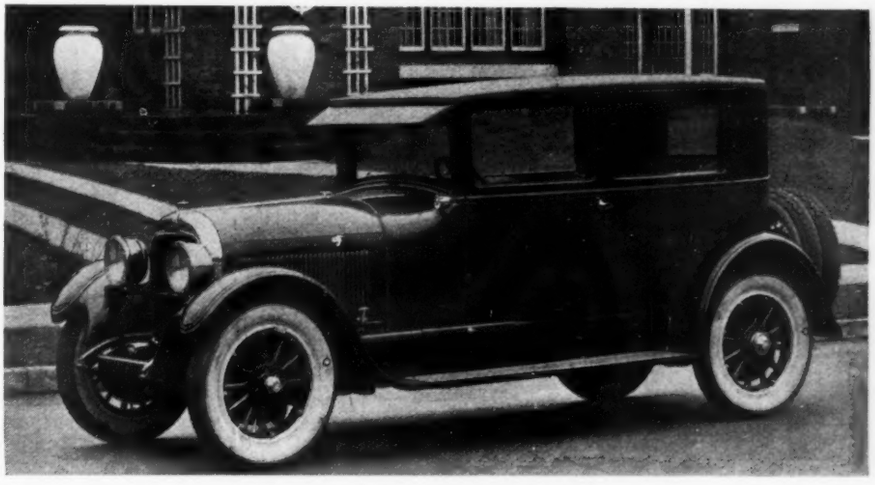
This car also has the regular Kissel full crown individual sport fenders and three quarter length running boards. It is finished in black Duco, with three line crimson stripe and crimson wood wheels, and comes equipped with spare rim on the rear behind the trunk rack. Other equipment includes headlights, cowl lights, combination stop and taillight speedometer, ammeter, oil gage and dash lamp. In this line of six is a new De Luxe model brougham sedan similar in general appearance to the brougham. It has four 32 in. doors and is upholstered in silk plush mohair. This car comes with full equipment, including such items as front and rear bumpers, electric clock, trunk, etc.

Cadillac Coach Introduced All Over the Country at the Same Time

WITH the introduction of the Cadillac coach at the New York show and simultaneously in dealer salesrooms throughout the country, all General Motors passenber car lines will include a Fisher built body model of this type. The new model lists at $3,185, which is also the price of the Cadillac open models. Otherwise the line is continued without change, except that the scroll embossed nickel radiator shell, which heretofore has been used only on the custom built models, will be furnished on the standard line.

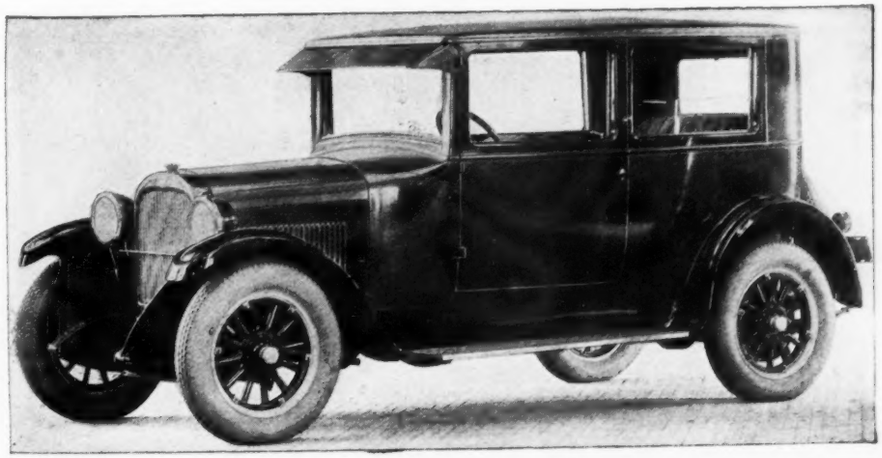
The new coach is mounted on the standard 132 in. wheelbase V-63 chassis. It is a two-door job with the conventional seating layout for five passengers. It is finished in green Duco with striping to match, and is upholstered in taupe mohair plush. Marshall springs are used in the seat cushions. The width of the rear seat is 50½ in., providing ample room for three passengers.

Equipment on the coach consists of rear view mirror, automatic windshield wiper, Fisher VV one-piece windshield, dome light, sun visor, inside thumb lever lock on left door and outside lock on right door, window regulators on door and quarter windows, curtains on rear and quarter windows, foot rest, trunk rack and nickeled lamps and hub caps.



Cadillac V-63 five-passenger coach

New Dodge Coach Is Finished in Lacquer



Showing the new Dodge lacquer finished coach

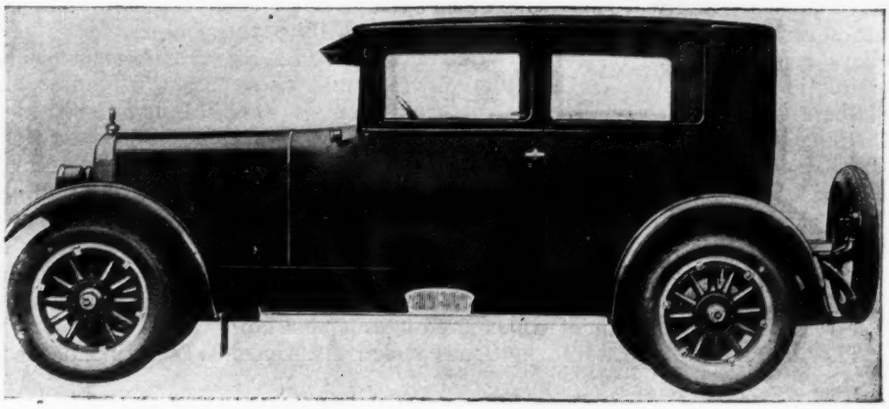
DODGE BROTHERS is now in production on a five-passenger coach listing at $1,095 which will be exhibited for the first time at the New York show.

The body is finished in blue Duco with yellow striping, the shroud and belt in black and the artillery wheels in blue. Each door has a pull-to handle and the right door is fitted with a Yale lock. Upholstery is dark brown. Equipment includes rubber mat in front section and carpet in rear, dome light, foot rest, mechanical window lifters, gearset lock, automatic windshield wiper and one-piece windshield with sun visor. Balloon tires are standard equipment.

Chandler and Rollin Add New Bodies, Apperson

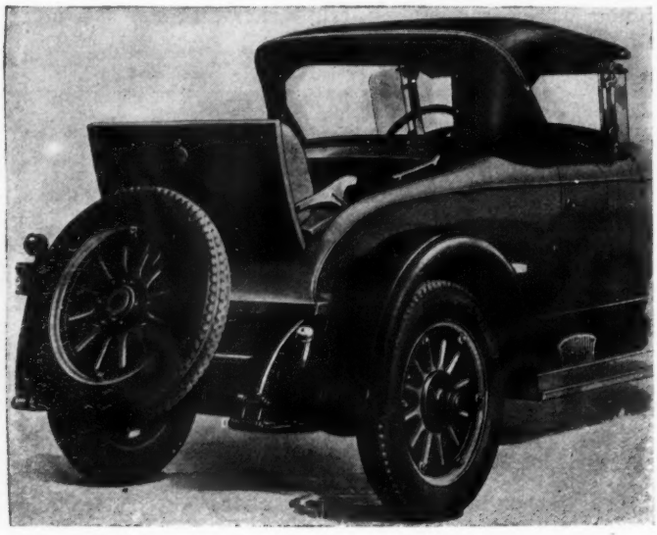
CHANDLER has announced three new body models and some minor changes in the engine and transmission. The leader of the new bodies is the Coach Imperial, a 5-passenger two-door sedan priced at $1,585, the same as the 5-passenger touring car. The other new bodies are the 5-passenger sport touring and the Comrade roadster with rumble seat.

The coach seats three in the rear seat and two in the front. Both front seats fold forward and the doors are sufficiently wide to allow easy access to the rear compartment. Upholstery is a worsted material and the finish is in blue. The windshield is the Fisher VV.



New Chandler coach which is finished in blue with blue upholstery and equipped with the Fisher VV windshield

The new 5-passenger sport touring car is finished in Duco, with an option of Luxor blue or two-tone gray green. A new form of single glass windshield is used. It is supported by castings that permit the stanchions to be made straight, allowing a wide glass at the bottom. Side wind wings are standard equipment. An innovation is the manner in which the front seat is trimmed, the seat cushion fitting underneath the back of the seat, leaving the back springs free for action and doing away with the crevice at the rear of the seat cushion.



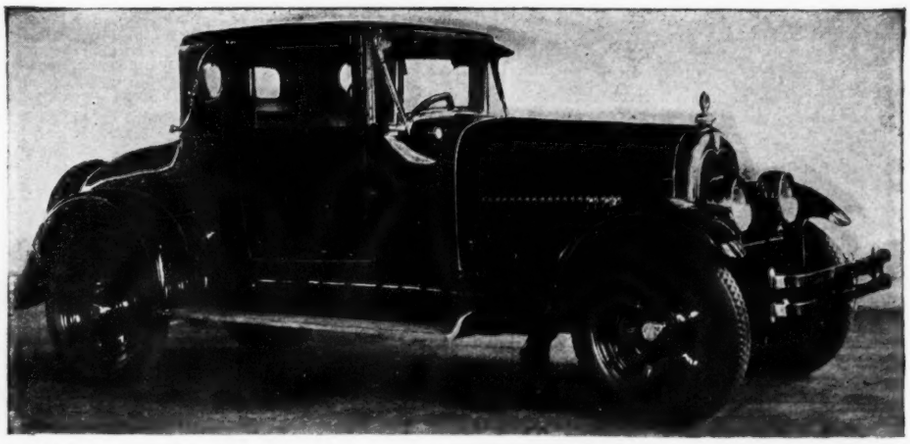
Showing the details of the rumble seat in Chandler's new Comrade roadster

The new Comrade roadster, a comparatively recent addition to the line, has been greatly improved, the principal change being in the rumble seat design. The deck that is raised toward the rear of the car carries the back seat cushions, and when it is raised it automatically puts into position the side arms of the seat. The forward half of the trap is arranged to fold down and back. A new style tire carrier is mounted at the rear. It is a complete wheel in natural wood finish, upon which the spare tire is fastened by two easily adjusted lugs.

The engine on the Chandler chassis has a larger oil pump, giving considerably more oil pressure. The pistons are of a new type with the pins floating in two phosphorus bronze bushings, and are fitted with oil regulating rings. The traffic transmission, while of substantially the same design as before, has been materially refined.

A REPORT was recently made by W. E. Jominy of the University of Michigan on a comparison of some of the properties of charcoal and coke gray cast irons. His report shows that the average values for Brinell hardness, transverse strength, tensile strength and deflection for a considerable number of heats of charcoal irons are appreciably higher than for a similar number of coke irons of closely comparable chemical composition. Such differences did not disappear on a remelting of the cast irons. Some years ago J. E. Johnson, Jr., stated that similar differences in strength of cast irons were due to differences in the oxygen content of the metal. The Bureau of Standards has been supplied with samples of most of the irons listed by Mr. Jominy and will make analyses for oxygen by the vacuum fusion method in the attempt to throw some light on the supposed influence of oxygen in such material.

Apperson Adds Straight-Away Eight

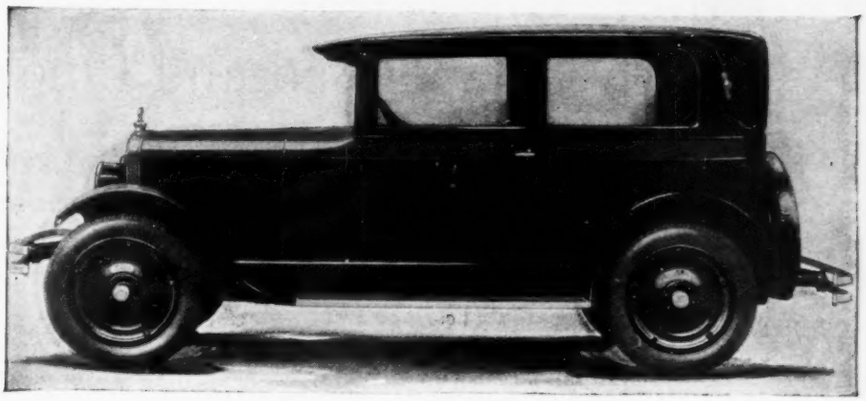


New Apperson Straight-Away Eight coupe, which sells for $2,800 and is equipped with mechanical gearshift and dashboard emergency brakes. The Six and V Eight are continued

and Case Add New Chassis to Their Present Lines

ROLLIN'S 1925 line will include four body models, as follows: Touring car at $1,155, coupé and brougham at $1,325 and a sedan at $1,455. All but the coupé, which seats three passengers, are five-passenger bodies and the prices represent an increase of $140 to $160.

The brougham is a new body with two wide doors so arranged that access to rear seat is possible without disturbing occupants of front seat. It is finished in Duco, in common with all other bodies, and is trimmed in worsted fabric. A one-piece windshield and built-in visor are fitted. There are no radical changes in design.



Two-door brougham which is added to the Rollin line

Fuel-Air Ratio and Engine Performance

REPORT NO. 189 of the National Advisory Committee for Aeronautics, bearing the above title, by Stanwood W. Sparrow, deals with the results of an investigation made to determine what gasoline-air ratio gives the maximum power, whether the value of this ratio is appreciably affected by such changes in air pressure or temperature as are encountered in flight and what percentage of its maximum power an engine develops when supplied with a mixture giving minimum specific fuel consumption.

From tests carried on during a period of nearly four years it was found that: (1) with gasoline as a fuel maximum power is obtained with fuel-air mixtures of from 0.07 to 0.08 lb. of fuel per pound of air; (2) maximum power is obtained with approximately the same ratio over the range of air pressures and temperatures encountered in flight; (3) nearly minimum specific fuel consumption is secured by decreasing the fuel content of the charge until the power is 95 per cent of its maximum.

Presumably this information is of most direct value to the carbureter engineer. A carbureter should supply the engine with a suitable mixture. This report discusses what mixtures have been found suitable for various engines. It also furnishes the engine designer with a basis for estimating how much greater piston displacement an engine operating with a maximum economy mixture should have than one operating with a maximum power mixture in order for both to be capable of the same power development.

A copy of Report No. 189 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

New Jay-Eye-See Models Supplement Present Line

PRODUCTION is now under way on the new Jay-Eye-See line of automobiles by the Case Motor Division of the J. I. Case T. M. Co. The chassis is practically identical with the present Model Y line, which will be continued. Both models have Continental six-cylinder engines, Model Y 3¾ by 5, the new models 3⅜ by 4½. A 1½-in. carbureter is used on Y models and a 1¼-in. carbureter on the new model, both Scheblers.

Some of the other differences in sizes and dimensions are outlined below:

	J.I.C.	Model Y
R. axle shfts. —diameter	1¾ in.	1 7/16 in.
Frame	6 1/16 x 2½ x 5/32 in.	6⅛ x 2½ x 7/16 in.
Brake drums	14x2 in.	16x2½ in.
F. springs	2x39 in.	2x39½ in.
R. springs	2¼x55 in.	2½x57 in.
Wheelbase	122 in.	132 in.
Tires (cord)	32x4½ in.	33x5 in.

Both models have Lockheed four-wheel brakes and Saal pressure chassis lubrication. Balloon tires are extra.

Above—The Jay-Eye-See Special touring listing at $2,160. The sedan sells for $2,590; brougham at $2,690. Other models are the roadster at $1,840 and touring at $1,885

Gardner Eight-in-Line Production Begins with One Closed and One Open Model

Duco two-tone color combination standard on both models. Windshield visor extends over top of brougham. Lycoming engines used in both four and eight-cylinder models. Frame has six cross members.

WITH the object of offering its dealers a line of wider appeal, the Gardner Motor Co., Inc., of St. Louis, Mo., has added an eight-in-line model, which is to be made as a brougham and a special touring car, both of which are to sell for the same price—$1,995. Both are five-passenger cars, with a 125-in. wheelbase and regularly equipped with 30 to 5.77 in. balloon tires, four-wheel brakes and Disteel wheels. A two-tone Duco color combination is used on both models.

The brougham is built with a low-swung body, which extends only as far as the center of the rear wheel, thus allowing sufficient room for a large sized trunk and the extra wheel and tire. A double belt-line extends entirely around the car. The windows are of clear-vision plate glass and the interior is upholstered in velour. Doors are 31-in. wide and have walnut panels and double locks. A one-piece ventilating type windshield with automatic wiper is fitted. A visor over the windshield is secured by extending the top.

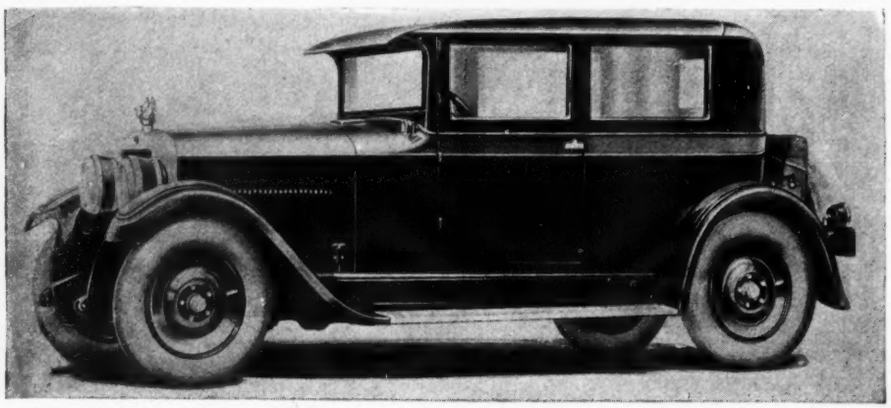
Other features of the Gardner brougham include satin-finish hardware, rotary type lifts on all windows, dome light, rear vision mirror, flush type cowl ventilator, combination stop and tail light, nickeled radiator and transmission lock.

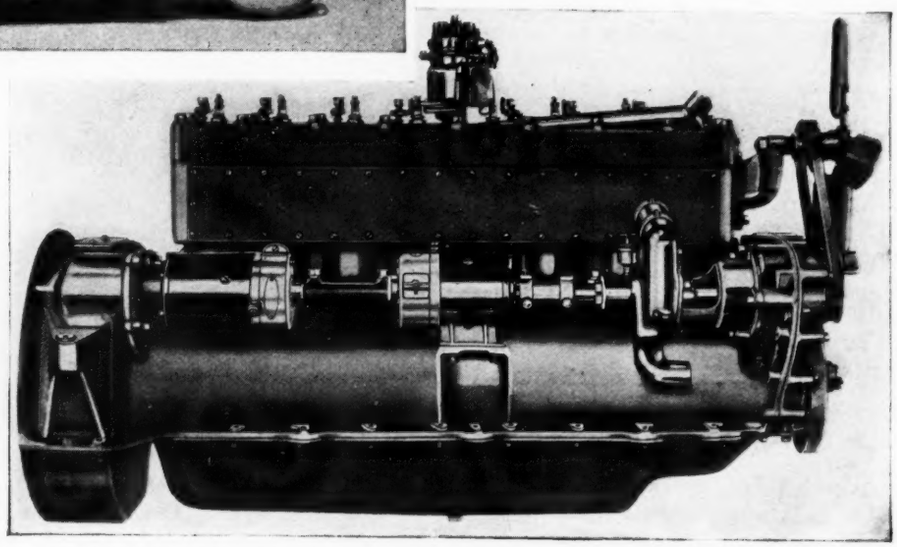
Refinements such as a permanent top, flat light reflector in headlights, spotlight and double bar bumpers in front and rear are also found on the special touring model, the seats of which are upholstered in Spanish leather. On both open and closed models the instruments, including a heat indicator and gasoline gauge, are grouped under a single glass oval panel, which is lighted indirectly.

As in the case of the Gardner four-cylinder model, the engine in the new eight is of Lycoming make. This engine has been described in these columns before. In the Gardner eight the engine is fitted with a Swan manifold and a cylindrical type vertical oil strainer which can be readily removed for cleaning. Oil pressure is automatically controlled by the opening and closing of the throttle.

The frame is made up with 7-inch side rails and has six cross members, two of which are tubular. It is heavily gusseted. Semi-elliptic springs are used all around. Chassis lubrication is by the Alemite system, but the fan and the universal joints are oil lubricated. The radiator of the eight is of an entirely different design from that of the Gardner four; it is nickeled and has the Gardner nameplate worked out in a satin bronze.

The engine of this straight-in-line eight has a bore of 3⅛ and a stroke of 4½ in. and develops 75 hp. The clutch is a Borg & Beck, the carbureter a Schebler, the radiator a Fedders, the steering gear a Gemmer and the electrical equipment is Remy. Balloon tire type snubbers and a Fedders radiator are fitted.





Above — Brougham has 31-in. doors, velour upholstery and one-piece ventilating windshield. Right—Engine has a bore of 3⅛ in. and stroke of 4½ in.

EDITORIAL

1925

THE industry enters 1925 with production schedules lower and fundamental business prospects considerably better than on Jan. 1, 1924.

Twelve months ago the factories were turning out cars at top speed, but the economists were crying caution. Today manufacturing schedules are low and improvement is almost certain within the next few months.

A wealth of design improvement is evident at the New York Show. The great number of new things being brought out should prove a real stimulus to spring sales, particularly in view of the fact that dealers in most lines of cars have been able to reduce their car stocks to normal.

It is with confidence as well as pleasure that AUTOMOTIVE INDUSTRIES wishes its subscribers a very happy and prosperous New Year.

The Shows

THE wealth of new models and redesigned lines should give unusual punch to the automobile shows this year. At the New York Show this week an unusually large number of new things are being exhibited for the first time. The announcements made at this National Show should help to whet the curiosity of people in the smaller towns and bring larger numbers than ever before to the local shows.

Combination of these factors with general business improvement indicates a brisk spring selling season from which the manufacturers will profit materially. In addition to building cars, however, they will be keeping one eye on used car sales and the other on dealer stocks.

Parts Manufacture in Europe

EUROPEAN car manufacturers are well aware of the advantages of production in big quantities, which has enabled our manufacturers in many cases to undersell them, in spite of the fact that American wages are materially higher. Much has been published abroad in favor of the cutting down of model numbers, the consolidation of plants and the adoption of the assembling system of car production, but so far little real progress has been made along these lines. From the national standpoint, or the standpoint of the industry as a whole, the advantages are quite plain, but any particular board of directors naturally has the welfare of its own concern most at heart, and it is often difficult to see advantages to the individual concern in the adoption of such policies.

In America the assembling plan was adopted by many makers who entered the industry when it was still young. There was then much room for expansion and the assembling plan naturally made it easier to enter the industry, as it cuts down the capital requirements.

Conditions in Europe today are greatly different, however, and if there were to be a change to the assembling plan it would have to be by a complete reorganization of the existing industries, which naturally would involve many difficulties and uncertainties.

Legislatures Meet

1925 will be an important legislative year from an automotive standpoint. A large majority of the State legislatures will be in session sometime during the next twelve months and bills affecting automobiles will come up in almost every one of them.

Compulsory insurance, license fees, gasoline taxes, commercial vehicle regulation, and highway appropriations are among the important measures which will be discussed and acted upon.

It is expected that a regulatory act for buses will go through in Indiana and that the basis of license fees in Texas will be altered so that owners will pay less on the vehicle and more on gasoline.

A committee of truck owners and operators is urging standardization of laws in Michigan, while in the same State a committee composed of automobile manufacturers and dealers has recommended that license fees be based on weight and that the horsepower tax be eliminated. This latter group does not oppose the gasoline tax if it is used to reduce other fees.

Oil producers in California object to further increase in gasoline taxes, while in Oregon a committee appointed by the Governor is urging that automobiles be taxed on value instead of on weight and horsepower.

Automotive men all over the country are thinking and working on legislative problems. Uniformity of legislation, at least as regards underlying principles, while desirable, does not seem likely to make any great progress. Nevertheless, efforts toward uniformity should be pushed as much as possible.

IN a cabled report on the hardwood industry of Great Britain, Trade Commissioner M. M. Mitchell states that because "of the stability and bright outlook of the automobile industry, the consumption of hardwood during 1925 will be increased materially." Motor car manufacturers there declare that this coming year will be the biggest they have ever had. Several of the largest producers of popular priced cars are booked for the whole of their year's output. While this makes the English market very promising for the car manufacturers in that country, it is no less promising for the sale of American-made cars in that territory.

Our Industry Today—

Production First Half of December Was 10 Per Cent Ahead of Same Period in 1923—Year 1924 Second Best in Automotive History

NEW YORK, Dec. 29.—Reports from a number of automobile producing plants show production the first half of December running 10 per cent ahead of the corresponding period in November. The slowing-down operations the latter part of the month due to closing of plants during the holiday season will offset this gain and bring down the total output for the month.

Production of cars and trucks for 1924 is estimated at 3,650,000, of which 3,280,000 are passenger cars. This compares with 4,086,997 in 1923, with car production placed at 3,694,237, and makes 1924 the second best in the production history of the automotive industry.

The year has been one of high operations, based on the average monthly output, although the record established in 1923 was not reached. Conditions throughout 1923 were exceptional and warranted the maintenance of unprecedented schedules through the greater part of the twelve months. Some unforeseen factors retarded buying in 1924, and the Presidential campaign produced a certain hesitancy on the part of buyers.

With manufacturers governing their production by retail demand, the closing of the year finds the manufacturing branch of the industry with low inventories and the selling branch with practically no finished products on hand. This will be reflected in the resumption of high schedules by both car and parts makers with the turn of the year.

Caution, however, will continue to be the governing factor in operations, with plants operating only to the extent that actual orders or well based prospects for future sales justify. Parts makers increased their schedules somewhat during December, in view of larger commitments placed by car manufacturers. January will see a more notable advance in parts making programs, and most of the plants, it is now expected, will be operating at capacity.

Await Effect of Show

Concrete evidence of the buying mood of the consumer will be given at the New York show, which opens to the public on Jan. 3. Early indications are that there will be a considerable placing of orders by dealers, due to the low condition of their stocks and the bright outlook for early year sales to retail buyers.

Sales conditions throughout the country varied widely during December, some cities reporting an increase over November. Local conditions as a rule are reported to be excellent for an immediate resumption of purchasing after the new year opens. Employment is good.

Foreign markets are expected to absorb a larger part of the output of American plants next year than ever before.

Optimism Prevails in Sales Outlook

Fairly Good Level Maintained as Old Year Closes—1925 Opens Bright

NEW YORK, Dec. 31—Optimism is the keynote of the sales outlook for next year, based on reports received by AUTOMOTIVE INDUSTRIES from its correspondents in leading distributing centers of the country.

In some communities the year 1924 closed with sales in December running behind those reported for November, but on the whole a fairly good level was maintained. Increased Christmas sales of new cars were noted in some communities over a year ago, and the dealers in one territory, Birmingham, Ala., report that they could have sold more cars during the holiday season if they had been able to obtain them from the manufacturers. As in past months, local conditions continue to play an important part in sales.

Northwest Area Brightens

The horizon in the Northwest area is growing considerably brighter. After declaring that a "surge of buying" is about ready to begin in that region, the Minneapolis correspondent says:

> The improvement is due to good crops, high prices for produce, ability to liquidate debts and to begin to buy again after an agricultural depression that came on after the war. For the first time in a long while North Dakota banks have money to loan. In fact in the whole territory banks are seeking borrowers.
>
> The average territorial distributor of automobiles acknowledges 100 per cent and up better business in 1924 than in 1923. An indication of the trend of expectation is the fact that dealers are practically all taking more space for the February automobile show in the Twin Cities than heretofore. Buying has begun already in the rural districts, but it is only a nibble to what is expected as soon as the touring season starts.

Sales were particularly brisk in December in the Kansas City area, though not reaching the November mark, which was an exceptionally good month on account of open weather.

"The cause of the better trade in new cars," says the Kansas City report, "was the marked improvement in spirit in the territory. People have confidence, money is actually more plentiful and those who have it are ready to spend it. The result is that automobile selling is approaching normal, but has not yet reached that level. This territory, in fact, will require another good crop year to bring it up to the prosperity conditions. And this other crop is actually in sight."

Conditions in the far West vary. A falling off during December in the volume of sales is reported by the correspondent in the San Francisco region. This is attributed to the following factors:

1. Extensive Christmas buying in other lines.

2. Caution of dealers in taking in used cars.

3. Unsettled public opinion, due to recent price-cutting, leading the public to believe that new models at still further reduced prices are to be put on the market soon.

The report further says:

> All farm crops are good and have been sold at good prices; there was an abundant rainfall in December and business in general is improving, though collections are slow. Indications are that January business will be better than December, though there is a strong inclination in the public mind to wait for the spring show before buying, in the hope of new models at reduced prices.

Los Angeles reports that low priced cars have been the heaviest sufferers in the sales decline during December. Various efforts to stimulate sales in that section appear to have been unavailing and the year closes with the twelve months showing a loss over the previous period.

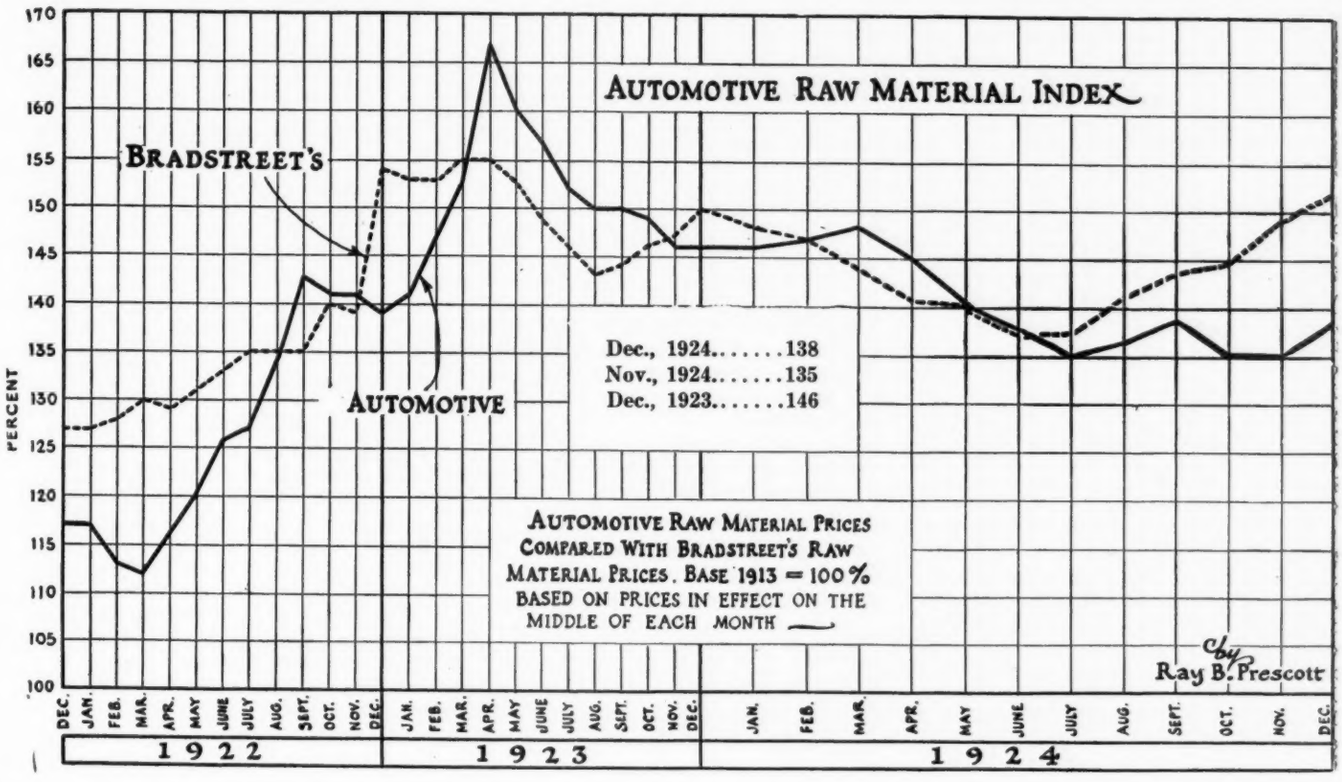
Coast Outlook Cheerful

Seattle sales have not been up to the average, but better times are looked for. Lumber, the key industry of the Pacific Northwest, is reported to be strong, with the certainty that it will continue so for the next six months. In the last few months farmers have liquidated numerous debts, some of which have been pyramiding for three years, indicating a good rural market for cars.

Sacramento business has been good and bright prospects are held out for future sales, not only because of general business conditions but because "the per capita ownership of cars here still is not high and highway construction is proceeding rapidly." Dealers are confident

(*Continued on page* 33)

COSTS OF MATERIALS UP AS YEAR ENDS



Optimism Prevails in Sales Outlook for New Year

(*Continued from page* 32)

that 1925 sales will exceed those of 1924 by a wide margin.

Other sections of the country report varying conditions. Bad weather has retarded sales in St. Louis, both new and old cars being affected.

Cincinnati looks forward to an active year of sales, the improvement in conditions having started in September. There is practically no unemployment in the city and wage earners are receiving a high rate of pay. Living expenses are high in the city, which absorbs much of the wage earners' pay, but are lower in the rural sections, so that sales in the latter sections doubtless will show the greatest increase.

Efforts of Cleveland dealers to rid themselves of used cars have been successful in a marked degree. Sales have attracted purchasers from other cities, one dealer in Toledo taking home with him forty used cars and a dealer in Akron eight. The Cleveland report says:

"These efforts have cut down used car stocks to the point that it seems the average dealer here will not be seriously handicapped when prospects offer used cars as part payment for purchases of new cars."

In Columbus sales dropped off during December, with the higher priced cars most seriously affected.

Sales in Toledo have been as good as last year. Farm markets are brightening a little and money seems to be plentiful. Bankers look for a slight stiffening of rates in the next few months.

Conditions in the East have not been particularly good. Boston sales have fallen. Philadelphia city sales have not been good, but rural business shows improvement. The outlook for farmer sales in the Philadelphia district is bright. Similar conditions and outlook are reported from Baltimore. Northern Maine in the big potato section is being affected to a degree by the poor financial outlook there, but business is expected to pick up following the New York show, which means more consistent steady selling through the spring of 1925 instead of a fluctuating market, such as marked 1924.

Cotton Helps in South

Medium and low priced cars still are selling well in the Atlanta district, although there has been a falling off in the higher priced models. The cotton crop will be of material assistance in keeping the general level of sales high.

Conditions in the rural sections of Indiana are far better than they were a year ago and a good January and February are in sight. No greatly improved demand for used cars is expected until local industrial conditions improve, and this is not expected until spring.

Birmingham, Ala., dealers look for steady sales in January, with a more active market opening in the spring, start on increased business coming not later than Feb. 1. Lower priced cars have been in particularly good demand.

December in Louisville, Ky., was on a par with December of 1923. The report says:

In January automobile sales in the city are expected to slow up somewhat on top of a brisk December. In the State, however, predictions are that trade will be good, because of the distribution of several million dollars to Burley tobacco growers.

Better sales are looked for in the Detroit zone. City business is expected to be better than in the past, owing to improved industrial conditions. This is declared to be particularly true of cities in which many main automotive plants are located.

The report from Indianapolis indicates improvement there. Spotty conditions are reported in the Milwaukee territory, the correspondent saying, however:

People admit that automobiles are very cheap. Banks have plenty of money to loan at low interest rates. This is taxpaying time and local taxes are the highest on record. After taxes are paid and Christmas bills are out of the way, it seems reasonable to expect that automobile purchases will increase, provided that weather conditions are favorable and a buyer does not hesitate for fear that cold, snow, and slush will ruin the appearance of his car for a few days or weeks.

It cannot be denied that weather has much to do with the selling of cars in this zone, where the thermometer ranges from 95 to 98 in July and August, to 15 and 18 below in January and February. The real selling season, therefore, may be described as the April-October period.

Nash to Market New Ajax Car in Spring

Will Be Built in Former Mitchell Plant at Racine—Kenosha Works Enlarged

MILWAUKEE, WIS., Dec. 29—Informal announcement has been made that the new Ajax car, to be built by Nash in the old Mitchell plant at Racine, Wis., will probably be ready for the market on March 15 or April 1. Experimental models have been on the road for several months. Meanwhile the Ajax plant is being equipped with new and modern tools throughout, the Nash interests having purchased the Mitchell group bare of equipment. The capacity will be from 200 to 300 cars a day, or 60,000 to 90,000 a year.

According to James T. Wilson, vice-president, the new Ajax will not contain any striking innovations. It was designed to round out the Nash line in response to the general request of Nash dealers, who found that many prospects who feel they cannot afford to buy a Nash special or advanced six nevertheless want Nash-built quality, if offered in a popular-priced car.

At the same time that the Ajax is being perfected and made ready for production the Nash interests are increasing the capacity of the Kenosha main works about 25 per cent and the Milwaukee branch factory 50 per cent. The advanced six is made at Kenosha and the special six in Milwaukee.

The former LaFayette plant, adjoining the Milwaukee Nash works, is now being remodeled and new equipment will be installed for production of the Nash special six.

The Milwaukee plant is operating at about 75 per cent of capacity and prospective schedules call for complete capacity in both by early spring.

Nash production in 1924 will be approximately 53,000 cars, compared with 56,000 in 1923.

New Ajax Not to Be at Show

RACINE, WIS., Dec. 29—The Ajax Motor Co., the Nash subsidiary which is planning production of a new automobile, will not have an exhibit of its product at the New York show, according to an announcement made here. It is understood that actual production by the Ajax company will not commence until July, 1925.

Goodyear to Operate New Subsidiary in January

AKRON, Dec. 29—Officials of the Goodyear Tire & Rubber Co. will formally take over operation of the Rotch Fabric Mills, at New Bedford, Mass., next month, it is announced. The mills were purchased recently by Goodyear in order to obtain a larger amount of cotton fabric for its rubber factories.

L. S. Hall will be acting superintendent and H. M. Coulter, assistant treasurer of the new subsidiary. Mr. Hall was formerly superintendent of the Goodyear textile mills at Los Angeles, while Mr. Coulter was connected with the Goodyear cotton mills in Connecticut.

The New Bedford mills have 60,000 spindles, with a capacity of 10,000,000 pounds of fabric yearly.

Mitchell Motor Creditors May Get 20 Per Cent

MILWAUKEE, Dec. 29—Creditors of the defunct Mitchell Motors Co. of Racine, Wis., may realize 20 per cent of their claims if the courts uphold two rulings made by Milton J. Knoblock, referee, respecting government claims on war contracts.

The government claimed $475,000, alleged to have been improperly paid to Mitchell on war contracts and bonuses on motor trucks for the army, and the referee rules that this claim should properly be audited at only $103,662.

The second ruling is that the government is not entitled to priority in its claims, except for taxes.

Claims against the Mitchell company aggregate about $3,900,000, while Herbert F. Johnson, trustee, has on hand, available for distribution in dividends, a little more than $1,000,000. Stockholders have abandoned hopes of any realization.

New Company Organized to Manufacture Bodies

LITTLE ROCK, ARK., Dec. 31—The Wonder State Manufacturing Co. has been organized here with a capitalization of $250,000, of which $130,500 has been subscribed, for the manufacture of automobile bodies.

The president is Dr. R. L. Saxon, who recently purchased the plant of the Climber Motor Corporation at receiver's sale. W. E. McKemie, Texarkana capitalist, is vice-president and L. S. Goodwin, Little Rock banker, secretary. M. L. Wellborn, Arkadelphia, is treasurer. These officers, with M. E. Clifton, compose the board of directors. The other stockholders consist of A. L. Barber, local attorney, and C. L. Saxon of Camden. Mr. McKemie, who for the last 15 years has been organizer and sales manager for various manufacturers and corporations, probably will be sales manager.

Mr. Wellborn, who now is manufacturing porch furniture and similar products in Arkadelphia, probably will move his plant here for consolidation with the Wonder company.

The newly organized concern has acquired 10 acres adjacent to the Climber factory.

Winnebago in Bankruptcy

DIXON, ILL., Dec. 31—Involuntary bankruptcy proceedings have been started against the Winnebago Tractor Co. of Dixon.

Gillett Products Co. Seeks Avery Plant

New Merger Company Plans to Start Making Parts at Peoria, Ill.

PEORIA, ILL., Dec. 30—The Gillett Products Co., representing a merger of six concerns manufacturing automotive radiators, metal tubing, automobile wheel locks and automotive hardware, is negotiating with officials of the Avery Co. for the purchase of its plants and buildings for location here of the central production unit of the new merger.

Phil F. Sperry, Chicago, vice-president and general manager, who has been conducting conferences here, announced that if the company failed to secure the Avery plants it would proceed to erect its own factory. It has prospective sites under consideration.

The Gillett Products is a Delaware corporation with $1,400,000 stock and it plans to issue $400,000 first mortgage bonds at once to start production. The company intends to bring 100 skilled men into the Peoria plant at once to start the production and then increase its forces to as high as 1000. It has orders on hand to keep that many busy, officers claim.

The company deals with jobbers, automobile dealers and accessory supply firms, marketing its products under various trade names, including Universal hexagon radiator, American non-bursting Ford radiator, Hooven hex-tube radiator, Perry auto wheel lock, Niagara cellular radiator, Standard Ford radiator, Standard spot-light, luggage carrier and stoplamp. It controls valuable patent rights to radiators and is receiving royalties from many concerns making special patterns or particular models. Thirty patents covering these parts and machines for making them are held by the Gillett company.

Charles W. Gillett, Chicago, is president of the company; Phil F. Sperry, Chicago, vice-president and general manager; Harry R. Hargis, sales manager; Walter H. Stone, treasurer, and James Carswell, secretary.

Holt Tractor Recalls 300 Men to Work Jan. 1

PEORIA, ILL., Dec. 30—The Holt Tractor Manufacturing plant called 300 employees to return to work Jan 1. They had been laid off when the argicultural depression forced curtailment of operations. This became necessary in order to keep pace with the production program adopted by the company and made imperative by orders from both home and foreign fields.

There are now 1500 men on the pay rolls, equal to the largest during the peak of the World War and within 200 of the total capacity of the plant.

Haynes Plant to Go at Auction Jan. 22

Bondholders May Buy It in and Then Lease It to an Operator

INDIANAPOLIS, Dec. 31—Auction sale of the Haynes plant, good will, name and production materials has been authorized by Harry C. Sheridan, federal referee in bankruptcy. Date of sale has been set for Jan. 22, but the place of sale has not been announced.

It is considered probable in Kokomo that the bondholders will buy the plant in with $1,450,000 of outstanding bonds and will then lease the plant to an operator.

The company was declared a bankrupt in the federal court here Oct. 23 and on Nov. 3 Robert Tudor was named trustee, with orders to operate the service plant until further court orders were issued.

It is understood that Mr. Sheridan has been continuing to hear claims of creditors. A short time ago authorization was given the trustee to manufacture 200 cars from materials on hand and it is understood that such work will continue until the sale is made.

To Exhibit in New York

KOKOMO, IND., Dec. 29—Developments in the affairs of the Haynes Automobile Co. have made it possible to arrange for the exhibition of Haynes cars in the New York show, although only recently it was announced that, for the first time since motor vehicle shows have been held in New York, there would be no Haynes exhibit.

Among the reasons for the decision to send Haynes cars to the show is the fact that a sound reorganization is believed to be in sight. With this in view, members of the bondholders' committee believe that an exhibit in the show to be of great importance. This will be the 25th consecutive time that the company, now in receivership, has participated in the show.

Owing to the withdrawal of the exhibit of the Westcott company, Haynes has been assigned to space No. 24.

No announcement was made regarding an exhibit at the Chicago show.

Inventory Improvement Noted by Chicago Bank

CHICAGO, Dec. 31—The Federal Reserve Bank, of Chicago, in its review of business conditions in the middle west for November makes the following observations with respect to conditions in the automobile and retail field:

Wholesale distribution of automobiles during November shows a seasonal falling off from October, while the comparison with November, 1923, which indicates considerable activity on the part of distributors, reflects the decided improvement over a year ago in the inventories of dealers at this time.

Retail sales were below the preceding month and year. New cars in dealers' hands as of Nov. 30 were slightly less than on Oct. 31, and, compared with Nov. 30, 1923, a marked decline is shown.

Used cars sold during the month were in smaller volume than in October, but remained above that of a year ago. Stocks of salable used cars with dealers increased over the preceding month and year and represented approximately six weeks' business at the rate shown in the used-car sales of November.

Ford May Purchase Chester Ship Plant

CHESTER, Pa., Dec. 31—It is reported that negotiations have been started between the Ford Motor Co. and the Harriman interests for the purchase by the former of the Merchants Shipbuilding Co. of this place. R. H. Robinson, president of the shipbuilding company, would make no comment.

If the deal is closed it is understood the Ford company will use the Chester property for an assembling plant. It is also reported that the company is negotiating for the purchase of a large tract of land on which to construct a model village for use by Ford employees.

William G. Sproul, former governor of Pennsylvania, who was largely interested in the yard when it was known as Roach's Shipyard, when seen in Philadelphia said:

I cannot confirm the report, but I do know that the Ford experts have been making detailed inspections at the plant. The plant is owned by the Harriman interests, unless it already has been taken over by the Ford interests.

Morris Motors, Ltd., Buys Bollee Plant in France

PARIS, Dec. 20 (*By Mail*)—Morris Motors, Ltd. of Coventry, has completed arrangements for the purchase of the Leon Bollee automobile factory, at Le Mans, France, and will make use of it for the construction of Morris cars for the French and other Continental markets.

The Bollee company is among the oldest in France, but since the death of Leon Bollee the factory at Le Mans has been in production only on a small scale. At these works there were built the engines with which Wilbur Wright made most of his flights in France in the early days of his experiments.

William R. Morris has not announced his business policy for the French market.

Goodyear Pacific Branch Increases Production

AKRON, Dec. 29—The branch factory of the Goodyear Tire & Rubber Co. at Los Angeles, has gradually increased its production of tires, according to Vice-president P. W. Litchfield, until it is now making one-sixth as many tires as the main plant at Akron.

The far western plant was originally designed to manufacture one-seventh of the total Goodyear tire production.

English Law Changes Would Help U. S. Cars

They Are Best Adapted for Proposed Speed Regulations—Overseas Trade Gains

LONDON, Dec. 26 (*By Mail*)—The King's speech at the opening of Parliament foreshadowed the possible introduction of a bill to amend and consolidate laws regarding the use of road vehicles. Presumably this refers to a road vehicles bill which has been in draft for some time. The most important clause will be that dealing with the speed of motor vehicles, so that the present limit will be abolished in certain localities.

Amendments of this kind should prove advantageous to users of American cars, as their relatively higher power would adapt them to speedy travel. It is certain that much good will result by such an act in eliminating the multiplicity of traffic regulations existing in this country.

Overseas Trade Revives

Overseas trade in British cars continues to increase steadily. This revival is chiefly attributable to the fact that British automobiles are endeavoring to meet overseas conditions, while the recent cuts in price in the home market also have had the effect of corresponding reductions in prices abroad. It is thought that as roads improve in the colonies demands for light cars will continue to increase. Some improvement is also to be noted in the export of trucks.

Some fear is expressed that the Anglo-German Commerce and Navigation Treaty, which, it is thought, will be finally ratified by both governments, will affect the home automobile industry. Under most favored nation terms German cars once more will have an opportunity to compete on level terms with British vehicles. It is not expected, however, that this competition will assume a serious aspect.

Output continues to increase in numerous automobile and motorcycle factories. Night shifts have been put on in a few of the establishments specializing in light cars.

Motorcycle Trade Increases

Rolls-Royce has prepared its annual report, showing that, subject to audit, the profits for the year ended Oct. 31 last amounted to £163,000. The firm has decided to recommend at the annual meeting of shareholders at Derby, Jan. 12, 1925, that a dividend of 8 per cent. should be paid.

A feature of the British motorcycle trade during the last few months has been the boom in export trade to Central Europe. Germany, Czecho-Slovakia and Austria are all clamoring for British motorcycles, making what looks like a permanent business.

Men of the Industry and What They Are Doing

Murphy Made Franklin Manager

Ralph Murphy has been made manager of the H. H. Franklin automobile plant at Syracuse, N. Y., and E. S. Marks chief engineer. Mr. Murphy has been with the company for 15 years and has been in charge of engineering and assistant to the vice-president. Mr. Marks has been assistant engineer. Giles H. Stilwell was elected vice-president of both the H. H. Franklin Manufacturing Co. and the Franklin Automobile Co., succeeding John Wilkinson, former chief engineer who recently retired. E. H. Dann was elected to the directorate. The company has also organized an export department under the direction of S. E. Ackerman, sales manager. S. W. Dorman has been put in charge.

Pichette Becomes Adams Manager

Alfred J. Pichette has been made factory manager of the Adams Axle Co. of Syracuse, N. Y., succeeding Ralph Rosenburg. Mr. Rosenburg has been serving lately as consulting engineer for the Durant interests in Syracuse. Thomas Tobin has been made superintendent of the plant, with Bernard Miller as chief inspector. The Adams Axle Co. is still being operated as a separate institution, though closely allied with the New Process Gear Corp., another Durant subsidiary.

Tracy Advances with Oakland

W. R. Tracy has been appointed assistant director of sales of the Oakland Motor Car Co. in recognition of his excellent record of service with the Oakland organization over the last 14 years. He first joined Oakland as a salesman for the Detroit dealer, next becoming Detroit branch manager. In 1916 he became Michigan branch manager and later organized and managed the Cleveland branch. From this position he was moved to the factory as assistant sales manager and now becomes assistant to C. W. Matheson, vice-president and director of sales.

Klix Changes to American Body

George T. P. Klix has resigned as chief engineer of the former C. R. Wilson Body Co. to join the American Body Co. of Buffalo as factory manager. Mr. Klix is well known in the body building field, having served as engineer and designer with a number of leading producing companies and also in the custom body building shops. O. J. Crowe, who has been associated with the purchasing department of the Wilson company for ten years, will go to Buffalo with Mr. Klix to become director of purchases.

McGookin Joins Young

Earl W. McGookin, for the past several years sales representative in the Detroit district for the National Spring & Wire Co., has joined L. A. Young Industries, Inc., with whom he will act as sales representative, selling the Marshall type spring. The Young organization recently has undertaken extensive manufacture of Marshall type springs, taking over a large part of the equipment of the National Spring & Wire Co,. and setting up a special department at its plant to manufacture this product. Mr. McGookin, one of the best known of the sales agents specializing in sales to the industry, has been located in the Detroit district for 20 years. Previous to joining the National Spring & Wire Co. he was identified with Stewart-Warner company and other companies.

FORD 1924 OUTPUT PLACED AT 1,806,432

DETROIT, Dec. 30—Ford production figures for the United States plants by months for the year 1924, with December estimated, follow:

January	**161,933**
February	**167,241**
March	**178,308**
April	**181,960**
May	**157,925**
June	**135,048**
July	**140,233**
August	**140,376**
September	**157,906**
October	**147,408**
November	**128,094**
December, est.	**100,000**
	1,806,432

M. Goudard Visits America

Maurice Goudard, president of the Goudard & Mennesson Co., manufacturer of the Solex carbureter, sailed Dec. 24 from Cherbourg for America. M. Goudard intends to spend six weeks in the United States and Canada in connection with Solex interests. The Solex carbureter is already in production in Canada, and it is understood that the object of M. Goudard's trip is to make arrangements for manufacturing it in the United States.

Howard Returns to Cadillac

Earle C. Howard, formerly sales manager of the Cadillac Motor Car Co., and with that company from 1906 to 1919 has returned to that organization as an assistant to H. H. Rice, president. Mr. Howard left Cadillac in 1919 to become vice-president and general sales manager of the Lafayette Motors Corp., and more recently has held an executive position with Fisher Body Corp.

Wood Becomes Young Manager

Harry Wood, vice-president of the National Spring & Wire Co., has resigned to become manager of the Marshall spring department of L. A. Young Industries, Inc. Mr. Wood had been connected with the National company for upwards of the past eight years in manufacturing capacities and is well known in this branch of the industry.

Lasher Returns to American Chain

J. O. Lasher has returned to the American Chain Co. as advertising manager, The Reinke-Ellis Co. of Chicago having purchased the E. H. Clarke agency, of which Mr. Lasher has been president. Mr. Lasher will occupy offices in the American Chain Co. suite in the Grand Central Terminal, New York City.

Stahl Made General Manager

Otto A. Stahl, formerly of the New York branch of the General Motors Truck Corp., has been appointed president and general manager of the company to succeed W. L. Day, resigned. Mr. Day will continue as vice-president and member of the operations committee of the company at the request of President Alfred P. Sloan, Jr., of General Motors Corp.

Price Becomes Bendix Officer

J. L. Price has resigned as secretary, treasurer and director of the Chicago Pneumatic Tool Co. to become vice-president and general manager of the Bendix Corp., and vice-president of the Bendix Brake Corp.

Ford Appoints Vice-President

Peter E. Martin, for 21 years identified with the Ford Motor Co. and one of the four or five men associated with Henry Ford in his early days of manufacturing, has been appointed first vice-president of the company. Ernest C. Kanzler has been named second vice-president.

Morse Joins Maxwell-Chrysler

E. C. Morse, in charge of Wills Ste Claire sales for three years and recently resigned from that organization, has joined the sales division of Maxwell-Chrysler. Prior to his association with Wills Ste. Claire, Mr. Morse was connected with Hudson. He has been identified with the domestic and export sales field for a number of years.

Tuttle Goes with Checker Cab

J. H. Tuttle, for several years chief engineer for the Westcott Motor Car Co., has resigned and joined the Checker Cab Manufacturing Co., at Kalamazoo as chief engineer.

Perrot Here to Visit Shows

Henri Perrot, French brake expert, has arrived to visit the shows.

Output for 12 Months Reaches 3,559,136

Automotive Production for Year, December Estimated, Shows a Decrease of 527,861

NEW YORK, Dec. 31—Unofficial estimates place December output of passenger cars and motor trucks, inclusive of Ford production, at 210,000. This is a decrease of 8 per cent from the November figure.

Total output for the year 1924, with December estimated, amounts to 3,559,136, compared with 4,086,997 in 1923. The year just closing is the second best in the production history of the automotive industry, with a comparatively small loss from the 1923 total, despite the fact that 1924 suffered because of being a Presidential year, when there was somewhat of a disruption in retail demand.

December output fell far below that of the corresponding month a year ago, due to the fact that this year no high production schedules were maintained to turn out cars for spring stocking.

The decline from the November figure is attributed chiefly to the closing of many plants toward the end of the month for inventory taking, the first half of December showing a substantial gain over the corresponding period in November.

New Jersey Announces 29 Bus Regulations

TRENTON, N. J., Dec. 31—A list of 29 regulations designed to standardize buses in New Jersey and to promote the safety and convenience of bus patrons has been made public by the State board of public utility commissioners.

In the list there is provided a maximum length of 24 ft. and a minimum of 16 ft. The maximum width is fixed at 8 ft., with an inside height of 6 ft. 6 in. The driver's seat must be protected by wood or glass partition at the bank. Emergency exit doors in the center rear must be installed.

Other regulations require guard rails in the vestibule, hand rails with straps for passengers, suitable heating and ventilation, two sets of brakes, pneumatic or cushion tires and a fire extinguisher.

These regulations apply to all buses for which approval of the State board is sought. Buses already in operation must be made to conform to requirements as to safety doors within 90 days.

FORD PLANT TO INCREASE

MILWAUKEE, Dec. 29—The Ford Milwaukee assembling plant, which has been running on a four-day-a-week schedule, goes to five days on Jan. 1, and on Feb. 1 full time will be resumed, according to Harry M. Buckley, manager. The capacity is being increased about 25 per cent.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Dec. 31—The new year opens with industry and trade in general distinctly on the upgrade and with fundamental conditions and the temper of the business community as a whole more favorable than for many years past. Production in many basic lines is expanding, employment is increasing and commodity price averages are rising.

The volume of speculative trading in stocks is not so large as a few weeks ago, but prices continue to rise and each day brings a new list of high marks. Shares traded on the New York Stock Exchange last week reached a total of 6,065,282, as against 5,198,270 in the corresponding week last year and 4,714,850 two years ago.

A seasonal decline in railroad traffic was reported for the week ended Dec. 13, when revenue freight car loadings numbered 956,761, comparing with 968,256 in the preceding week and 899,757 in the corresponding period last year. Reports so far available indicate reduced gross earnings for railroads in November as compared with a year earlier, with reductions in operating expenses more than sufficient in many cases to compensate for the smaller receipts.

Business failures reported by Dun's Review for the five-day week ended Dec. 24 numbered 370, comparing with 496 for the full week preceding and 360 for the corresponding period a year ago.

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended Dec. 24 amounted to $11,378,000,000, reflecting a decline of 7.9 per cent from the total for the preceding week, but an increase of 31.5 per cent over that of a year earlier.

Fisher's index of wholesale commodity prices stood at 156.7 last week, the highest since the middle of October, 1923. The latest figure compares with 155.6 in the preceding week, the year's low point of 142.3 in July and the corresponding figure of 151 at the close of the preceding year.

Durant—Star Merger on Coast Completed

Details of Formation of Durant Motors, Inc., of California, Made Public

OAKLAND, CAL., Jan. 1—Announcement of the details of the merger of the Durant Motor Co. of California with the Star Motor Co. of California, to form Durant Motors, Inc., of California, has been made by R. C. Durant, president of the Durant company of this State, and Norman De Vaux, president of the Star Co. of California.

This is the largest merger of manufacturing corporations in this State, if not on the Pacific slope this year, and involves industrial resources valued at approximately $6,000,000.

Five months were required in the consummation of the deal, and thousands of stockholders in the Durant interests, all over the Pacific Coast, are interested. The merger will have a vital effect on the western automobile trade.

The new Durant Motor company in California is a direct result of the recent visit to Oakland by W. C. Durant. Executives of the new corporation say that the merger was made for the purpose of working manufacturing, distributing and sales economies which will benefit materially the Durant organization. Both Star and Durant cars are to be produced from a unit organization, doing away with much duplication of effort.

The younger Durant and De Vaux announce officials of the new corporation as follows: R. C. Durant, president; Norman De Vaux, vice-president and general manager; A. L. Warmington, treasurer; H. W. Curtis, director of sales; E. T. Tuller, sales manager; Ed Hill, assistant sales manager; George Scott, production manager; William Myers, comptroller, and F. W. Erickson, assistant comptroller.

Finance Company Formed for Studebaker Dealers

NEW YORK, Dec. 31—Industrial Acceptance Corp., which will finance Studebaker dealers, has completed its organization and made ready for starting operations Jan. 1.

The new company has a capitalization of $6,750,000 and is affiliated with the Industrial Finance Corp., which during the last five years has handled this class of business for the Studebaker dealer organization. For the 12 months ended July 31 the company's volume of Studebaker dealer financing amounted to $62,099,354, which compares with $26,456,530 in the previous year.

The company will extend its operations to include Studebaker dealers in Europe and South America, especially in Brazil and the Argentine. Arthur J. Morris is president.

Packard Cuts Prices on Closed Models

Six-Cylinder Line Reduced $640 to $840 to Open Style List Level

DETROIT, Dec. 31—In one of the most striking price reductions the industry has known, the Packard Motor Car Co. this week brought the prices on all closed models in its six-cylinder line to the same prices as the open models in this line. The reductions range from $640 to $840 and make a price range of $2,585 to $2,885, where formerly the range was from $2,585 in the open models to $3,675 in the closed. Prices of the eight cylinder line are not affected.

New and old prices follow:

	Old Prices	New Prices	Decrease
4-p. Roadster	$2,785	$2,785	....
5-p. Phaeton	2,585	2,585	....
4-p. Sport Phaeton	2,750	2,750	....
4-p. Coupe	3,275	2,585	690
5-p. Coupe	3,450	2,685	765
5-p. Sedan	3,375	2,585	740
5-p. Sedan Limousine	3,425	2,785	640
7-p. Phaeton	2,785	2,785	....
7-p. Sedan	3,625	2,785	840
7-p. Sedan Limousine	3,675	2,885	790

In a company statement accompanying the reductions it was declared that the reduction have been made in the midst of one of the most prosperous years in the company's history and with prospects ahead for a big year for the entire industry, because it was believed the increase in distribution would fully warrant it.

These new prices will be maintained, the company said, as long as the expected increase in volume of business is maintained. No change will be made in the make in quality of materials and the same standard of workmanship will be adhered to.

The company's quarterly financial statement just issued shows it to have in excess of $18,000,000 in cash and marketable securities with earnings for the quarter ending Nov. 30 of $1,872,753, one of the best quarterly periods in its history.

This makes the action on prices particularly significant in view of the large volume of business now being done. The company's financial position, said President Alvan Macauley, makes it possible for Packard to seize what it regards as a real opportunity to increase this volume.

(*Continued on page* 40)

Fisher Body Corp. Splits Stock on 4 for 1 Basis

NEW YORK, Dec. 29—Stockholders of Fisher Body Corp. at a special meeting today voted to authorize and issue 2,400,000 shares of common stock par value $25 to take the place of the present authorized and outstanding common stock of 600,000 shares of no par value.

Stockholders of record Jan. 14, 1925, will receive a letter setting forth their rights to exchange their stock on the basis of one share of old stock for four shares of new stock.

At the meeting it was announced that directors are scheduled to meet on Jan. 9 to declare a quarterly dividend due to be paid Feb. 2, and that the dividend declared at that meeting would be payable upon the new $25 par value stock.

No further dividends will be paid on the old common stock, and all subsequent dividends will be upon the new common stock. Therefore it is imperative that stockholders make prompt exchange of old stock for new.

FORD TO OPERATE A MINIATURE PLANT

NEW YORK, Dec. 31—Preparations have been completed by the Ford Motor Co. for installing in its branch here a miniature plant where cars will be assembled before the view of the public.

On the exhibition floor 100 skilled employees will put together each day a few of the various Ford models. Many of the parts used will be specially treated and much of the material will be nickel plated.

As the cars are completed they will be offered for sale, probably at prices somewhat higher than for ordinary stock models.

The exhibition will continue during the New York automobile show.

Fageol to Speak Before Motor Truck Convention

NEW YORK, Dec. 31—Frank R. Fageol, general manager of Fageol Motors Co., will speak on "The Future of the Motor Bus" at the open Motor Truck Convention to be held at the headquarters of the National Automobile Chamber of Commerce on Monday, Jan. 5.

Another speaker in addition to those already announced will be F. C. Horner of the General Motors Corp., who will talk on "How Can the Truck Industry Standardize on Cost Figures?"

Speakers and subjects previously announced include: G. C. Woodruff, general freight agent of the New York Central Railroad, "The Railroads and the Motor Truck" and B. B. Bachman, chief engineer of the Autocar Co., "Is Motor Truck Design Backward?"

CYCLE SHOW FEB. 9-14

NEW YORK, Dec. 30—The eleventh national motorcycle, bicycle and accessory show will be staged in the Seventy-first Regiment Armory, this city, from Feb. 9-14, according to Manager A. B. Coffman of the Motorcycle and Allied Trades Association. It has been two years since an exhibition of this character has been held in the metropolitan district.

A. A. A. Warns Against Radical Legislation

Major Britton Says Measures Affecting Automobiles Are Before 42 States

WASHINGTON, Dec. 31—A message of warning to motorists, automobile manufacturers and dealers against radical automobile legislation, now up for consideration by 42 legislatures in the States was sounded this week by Maj. Roy F. Britton, chairman of the legislative board of the American Automobile Association, with headquarters here. The utmost cooperation among automobile dealers and owners will be needed to assure the defeat of such anti-motor legislation, it is declared.

According to Major Britton, who urges all motorists to give their local automobile clubs active support against combating radical motor legislation, there are bills pending in State legislatures calling for various forms of compulsory insurance, gasoline tax revision bills, with increased taxation as their general aim, some advocating restrictions in the use of cars, others for the curtailment of autobuses, a multitude of measures against the so-called traffic evils, and a score or more of others, all of which either mean more taxes for the motorist or are adverse to motoring.

National automobile legislation is being watched closely by not only the A.A.A., Major Britton declares, but by such organizations as the National Automobile Chamber of Commerce, Motor and Accessory Manufacturers Association, National Automobile Dealers Association, Automobile Body Builders Association, Society of Automotive Engineers, and others.

State legislation, however, he points out, must be watched largely by the motor organizations within the States and active support of the anti-motor legislative campaign is asked by the legislative chairman, who has pledged the national motorist organization's support in so far as possible.

Ketterling Addresses Cadillac Old Timers

DETROIT, Dec. 29—The annual Old Timers' Banquet of the Cadillac Motor Car Co., with men in the service of the company for upward of five years as guests, was held in the General Motors Building.

Charles F. Ketterling, vice-president of General Motors Corp. and president of the General Motors Research Corp., who has just returned from Europe, was the speaker. He included in his address numerous incidents of his European trip. Charles M. Carson, industrial manager of Cadillac was in charge of arrangements.

There are now 2374 men who have been with Cadillac more than five years.

Places 1924 Output at $2,279,096,000

N. A. C. C. Preliminary Figures for 1924 Show 3,280,000 Cars and 370,000 Trucks

NEW YORK, Dec. 30—In preliminary facts and figures of the automotive industry for 1924, compiled under the direction of Alfred Reeves, general manager of the National Automobile Chamber of Commerce, production of passenger cars and motor trucks is estimated at 3,650,000, of which 3,280,000 were cars and 370,000 trucks. The entire production is valued wholesale at $2,279,096,000. Wholesale value of cars is placed at $1,994,540,000 and that of trucks at $284,556,000.

These figures compare with a production of 4,086,997 ($2,004,962,716) motor vehicles in 1923, of which 3,694,237 ($1,693,808,282) were cars and 392,760 ($311,144,434) were trucks. Production in 1924 represented a 10 per cent decrease from the preceding year.

Of the 1924 production, 39 per cent were closed cars, compared with 34 per cent in 1923.

A large gain in exports was shown in 1924, the total number of motor vehicles in that year being 380,000, as against 328,999 in 1923.

The figures show that in 1923 there were 43,588 motor vehicle dealers in the United States, while in 1924 the number of total car and truck dealers reached 50,512.

Packard Earns $1,872,753 in November Quarter

DETROIT, Dec. 29—Packard Motor Car Co. reports net earnings for the three months ended Nov. 30, or the first quarter of the company's fiscal year, of $1,872,753, compared with $1,161,439 for the corresponding period a year ago. After allowing for regular preferred dividends, profits were equal to 70 cents a share earned on the $23,770,200 common stock of $10 a share par value outstanding. This compares with 38 cents a share earned on the common stock during the corresponding period of 1923.

As of Nov. 30 of this year, the company's cash and marketable securities, the latter being chiefly United States obligations, totaled $18,155,579, an increase of more than $1,000,000 in three months. Net current assets amounted to approximately $30,000,000 or more than nine times current liabilities.

In commenting on the company's position, President Alvan Macauley says:

The company is entering the new year in an unusually strong position. Earnings are satisfactory and such basic factors as cash position and inventories were never better. The company is therefore prepared to handle the large volume of business which we believe is just ahead.

PRELIMINARY AUTOMOTIVE FACTS AND FIGURES FOR 1924, ISSUED BY THE N. A. C. C.

NEW YORK, Dec. 31—Preliminary facts and figures of the automotive industry for 1924 as issued by the National Automobile Chamber of Commerce follow:

PRODUCTION

Cars and trucks	3,650,000
Cars	3,280,000
Trucks	370,000
Percentage decrease from 1923	10%
Percentage increase over 1922	38%
Production of closed cars	1,300,000
Per cent closed cars	39%
Total wholesale value of cars	$1,994,540,000
Total wholesale value of trucks	$284,556,000
Total wholesale value of cars and trucks	$2,279,096,000
Tire production	45,000,000
Wholesale value of motor vehicle tire business	$627,697,000
Total wholesale value of parts and accessories, exclusive of tires	$872,838,000
Average retail price of car, 1924	$814
Average retail price of truck, 1924	$1,026
Number of persons employed in motor vehicle and allied lines	3,105,000
Special Federal excise taxes paid to U. S. Government by automobile industry in 1924	$144,000,000

REGISTRATION

Motor vhicles registered in U. S. (approximately)	17,000,000
Motor cars	15,200,000
Motor trucks	1,800,000
World registration of motor vehicles	19,500,000
Per cent of world registration owned by U. S. A.	87%
Motor vehicle registration on farms	4,600,000
Motor cars	4,175,000
Motor trucks	425,000
Miles of improved highway	455,000
Total miles of highways in U. S.	2,941,294

AUTOMOBILE'S RELATION TO OTHER BUSINESS

Number of carloads of automobiles and parts shipped over railroads	726,000
Rubber, per cent of, used by automobile industry	70%
Plate glass, per cent of, used by automobile industry	53%
Copper, per cent of, used by automobile industry	10%
Aluminum, per cent of, used by automobile industry	20%
Iron and steel, per cent of, used by automobile industry	10%
Upholstery leather, per cent of, used by automobile industry	65%
Gasoline consumed by motor vehicles, 1924 (gals.)	6,029,000,000
Crude rubber used in manufacturing tires (lbs.)	605,000,000
Cotton fabric used in manufacturing tires (lbs.)	191,000,000

MOTOR BUS AND MOTOR TRUCK

Number of motor buses produced	10,000
Number of consolidated schools using motor transportation	13,037
Number of street railways using motor buses	168
Number of buses used by street railways	2,500
Number of railroads using motor vehicles on short lines	174
Number of railroads using motor trucks as part of shipping service	33

EXPORTS

Number of motor vehicles exported	380,000
Value of motor vehicles and parts exported (including engines and tires)	$265,000,000
Per cent increase in motor vehicle exports over 1923	15%
Per cent of motor vehicles exported	10%
Number of motor vehicles imported	745

MOTOR VEHICLE RETAIL BUSINESS IN U. S.

Total car and truck dealers	50,512
Public garages	59,989
Service stations and repairshops	67,828
Supply stores	64,233

TO FORM FINANCE BODY

COLUMBUS, OHIO, Dec. 29—About 50 representatives of automobile finance companies in Ohio met at the Deshler Hotel to discuss ways and means of improving the status of these finance companies. Plans were laid for the organization of a State association to aid in securing larger down payments as a basis for better financing.

N.A.C.C. to Feast Automotive Pioneers

Large Number of Leaders in Industry to Be at Silver Anniversary Dinner

NEW YORK, Jan. 1—An unusual number of pioneers in the automotive industry will be in attendance at the silver anniversary dinner of the National Automobile Chamber of Commerce on the evening of Jan. 6 at the Hotel Commodore. The chamber has communicated with automobile manufacturers and has obtained the following names of executive officers still in the industry who were in it prior to 1901.

Autocar Co.—Louis S. Clarke, vice-president; John S. Clarke, vice-president; Miss Mary H. McMonigle, assistant secretary and treasurer.

Autocar Sales & Service Co.—A. B. Cumner, vice-president.

Apperson Automobile Co.—Edgar L. Apperson, chief engineer; Bronson C. Buxton, vice-president.

Cadillac Motor Car Co.—H. H. Rice, president.

Checker Cab Manufacturing Co.—L. F. Goodspeed, chief engineer.

James Cunningham Sons & Co.—A. J. Cunningham, president; James C. Dryer, vice-president; J. W. Fulreader, treasurer.

Dodge Brothers.—Russell Huff, director of engineering; Clarence Carson, assistant chief engineer.

Durant Motor Co. of Indiana.—W. R. Willett, president and general manager.

Garford Motor Truck Co.—R. M. Kincaid, vice-president.

General Motors Corp.—C. S. Mott, vice-president.

Gray Motor Corp.—F. F. Beall, vice-president.

Nordyke & Marmon Co.—W. C. Marmon, president of board of directors; H. C. Marmon, vice-president; W. H. Brown.

Packard Motor Car Co.—E. F. Roberts, vice-president; J. E. Locker, factory manager.

Pierce-Arrow Motor Car Co.—Charles L. Sheppy, chief engineer; B. W. Appleton, manager of purchases; William H. Locke, auditor; C. D. Cowles, parts manager.

Reo Motor Car Co.—R. E. Olds, chairman of the board; R. H. Scott, president and general manager; H. T. Thomas, vice-president; R. C. Rueschaw, director and manager of sales.

G. E. Smith, director and manager of purchases.

Rickenbacker Motor Co.—B. F. Everitt, president; E. V. Rickenbacker, vice-president; H. L. Cunningham, secretary-treasurer; C. M. Tichenor, factory manager; E. LeRoy Pelletier, advertising manager.

Rollin Motors Co.—Rollin H. White, chairman of the board; James G. Heaslet, president.

Sandford Motor Truck Co.—C. H. Sanford, president; F. W. Wilkins, general manager; G. W. Hoyt, sales and advertising manager.

G. A. Schacht Motor Truck Co.—G. A. Schacht, vice-president.

Walter Motor Truck Co.—William Walter, vice-president.

Wills Ste. Claire, Inc.—C. H. Wills, president; B. W. Twyman.

Yellow Cab Manufacturing Co.—P. H. Geyser, vice-president and general manager; R. Harry Croninger, assistant general manager.

Old-timers as rated by the Smithsonian Institution include such names as Charles E. Duryea, Elwood Haynes, Edgar Apperson, R. E. Olds, Henry Ford, James S. Clarke, Louis S. Clarke, Charles B. King, F. E. Stanley, Rollin H. White, J. D. Maxwell and H. H. Franklin.

FILMS TO ENLIGHTEN VISITORS AT SHOW

NEW YORK, Dec. 31—Two films will be shown continuously at the Bronx Armory during the national automobile show.

"Play Safe," concerned with safe driving, has been prepared through the cooperation of the United States Department of Interior, the American Automobile Association and the General Motors Corp.

"The Road to Happiness," dwelling on the relationship of highways to home life, is the product of the Bureau of Public Roads, the Highway Education Board, the National Automobile Chamber of Commerce and the Ford Motor Co.

Packard Cuts Prices on Closed Models

(*Continued from page* 38)

The Packard company is in ideal position as regards its closed body supply, as it makes the largest part of these itself and has perfected many practices in its own shops in the art of body building. The largest part if its production volume in recent months had been in closed models and the possibilities of increasing this volume are manifested by its price action.

The company is fully cognizant that the new model scale of prices tends to emphasize the practicability of closed car ownership, but it nevertheless will continue the manufacture of open models as before, because of the preference for these models among many Packard owners. However, it feels that the potentialities for increased volume lie more in lower priced closed cars than in low priced open cars and it is making its merchandise effort along this line.

DETROIT EMPLOYMENT 198,031

DETROIT, Dec. 29—A decrease of 1152 in industrial employment here is reported for the past week, as against an increase of 1986 the previous week. Employment now stands at 198,031 compared with 199,990 a year ago, when there was a reduction of close to 20,000 from the week before, owing to closing of plants for inventory taking. Decreased employment owing to inventory taking this year will not show itself until next week's report.

Move to Decrease Traffic Accidents

Work Started Toward Urging Adoption of Hoover Conference Recommendations

WASHINGTON, Dec. 31—Machinery has been set in motion urging the general adoption of the recommendation made at the National Conference on Street and Highway Safety relative to principles and plans for decreasing the number of traffic accidents. The aim of the conference was to make available to every State and community information and suggestions for the reduction of accidents as developed by the studies of eight committees of experts and acted upon by the conference.

Secretary of Commerce Hoover, who sponsored the meeting, has addressed a letter to the governor of each State transmitting a copy of the final report of the conference and suggesting that it be called to the attention of the State Legislature in the event that new motor vehicle and highway legislation is contemplated. He is also writing to the mayors of cities, local chambers of commerce, motor clubs and safety councils urging cooperation in making the recommendations permanently effective in their communities.

The recommendations are being prepared in the form of a printed report, which will be made available for the information and assistance of official and non-official organizations.

Pledges of cooperation already have been received from the American Legion and the National Association of Commissioners for Uniform Laws, two organizations having a wide influence.

Willys-Overland Names Prices of New Models

TOLEDO, Dec. 31—Willys-Overland Co. announces the prices of its new models as follows:

Overland 6-Cylinder	
Standard sedan	$985
De luxe sedan	1,150
Willys-Knight 6-cylinder	
Phaeton and roadster	$1,845
Coupe sedan	2,145
Brougham	2,295
4-passenger coupe	2,345
Sedan	2,495

Prices have been reduced on the Willys-Knight four-cylinder model as follows:

	Old Price	New Price
Phaeton	....	$1,295
Coupe	$1,770	1,495
Coupe sedan	1,550	1,495
Sedan	1,795	1,575
Brougham	1,995	1,695

No change in price has been made on the Willys-Overland four-cylinder model.

(The prices of the new models were received too late to be included in the description appearing elsewhere in this issue of AUTOMOTIVE INDUSTRIES.)

Automobile Exports Reach $102,594,486

Total for 11 Months Exceeds Like Period of 1923—November Shipments $9,001,629

WASHINGTON, Dec. 31—Exports of passenger cars during November, 1924, gained over those of the preceding November, but truck shipments declined, according to figures compiled by the bureau of foreign and domestic commerce.

In November of 1924 passenger car shipments totaled 11,619, valued at $9,001,629, compared with 10,875, of a value of $8,537,410 in November of 1923.

Truck shipments in November of 1924 are reported at 1898, valued at $1,469,668, as compared with 2918 of a value of $2,011,662 in November, 1923.

Total passenger car shipments for the 11 months ended Nov. 30, 1924, reached 140,109, valued at $102,594,486, contrasted to 116,966, valued at $83,105,269 in the corresponding period of 1923. In the same 11 months of 1924, truck exports totaled 25,605 of a value of $17,864,356, as compared with 22,793, valued at $13,606,927 in the corresponding period of the previous year.

Statistics in detail for November and for the 11 month period are shown in the table published on this page.

Canadian Car Exports Increase in November

OTTAWA, ONT., Dec. 29—November exports of Canadian built passenger cars amounted to 4352, according to the Dominion Bureau of Statistics, and compares with 3907 in November of last year.

During the 12 months ended in November, 13,366 motor trucks were exported, compared with 11,136 in the corresponding period of last year. Bicycle exports fell from 393 during the 12-month period as against 119 a year ago.

Exports of railway coaches in the 12 months totaled 373, against 21 in 1923.

Citroen Forms Italian Branch in Milan

PARIS, Dec. 21 (*By Mail*)—An Italian branch of the French Citroen Automobile Co. has been formed at Milan, under the title Société Italiana Auto Citroen, with André Citroen as president and M. di Carrobbio as general manager.

As M. Carrobbio is closely associated with the Alfa-Romeo Co. of Milan, it is thought that the new company will undertake the construction, or assembly, of Citroen cars at the Alfa-Romeo factory.

Exports, Imports and Reimports of the Automotive Industry for November of Current Year and Total for Eleven Months Ending November 30, 1924.

EXPORTS

	Month of November				Eleven Months Ending November 30			
	1923		1924		1923		1924	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, including chassis	13,812	$10,471,323	13,535	$10,485,396	139,944	$96,983,402	165,862	$120,641,215
Electric trucks and passenger cars	19	22,251	.....	.....	185	271,206	.....	.....
Motor trucks and buses, except electric:								
Up to 1 ton	2,332	942,282	1,384	573,269	18,063	6,689,925	12,548	5,302,832
Over 1 and up to 2½ tons	412	606,313	331	474,065	3,841	4,701,457	4,796	6,526,185
Over 2½ tons	174	463,067	130	391,710	889	2,215,545	1,411	3,501,150
Total motor trucks and buses, except electric	2,918	2,011,662	1,898	1,469,668	22,793	13,606,927	25,605	17,864,356
PASSENGER CARS								
Passenger cars, except electric:								
Value up to $500 inclusive	3,672	1,297,476	4,573	1,682,056	48,689	17,237,900	55,892	20,348,570
Value up to $800	2,619	1,738,933	3,025	2,102,387	27,220	18,015,599	39,535	26,926,332
Value over $800 and up to $2,000	4,347	4,733,173	3,720	4,355,730	38,521	40,842,063	41,447	46,251,781
Value over $2,000	237	667,828	301	861,456	22,536	7,009,707	3,235	9,067,803
Total passenger cars, except electric	10,875	8,437,410	11,619	9,001,629	116,966	83,105,269	140,109	102,594,486
PARTS, ETC.								
Parts, except engines and tires:								
Automobile unit assemblies*	618,735	103,683	578,199	128,414	24,021,791	3,820,579	10,767,869	2,409,648
Accessories and parts*	24,685,618	4,295,902	.....	.....	221,969,314	49,825,041	.....	.....
Automobile service appliances (not elsewhere specified)*	295,762	121,245	705,375	269,360	1,875,838	961,360	6,488,361	2,595,697
Station and warehouse motor trucks	19	19,341	5	4,138	215	115,209	131	81,238
Trailers	19	13,383	59	23,909	950	333,269	531	196,429
Airplanes	.....	.....	.....	.....	44	305,151	52	357,677
Parts of airplanes, except engines and tires*	12,700	8,951	3,043	2,989	273,060	58,003	165,312	165,021
BICYCLES, ETC.								
Bicycles and tricycles	3,023	30,882	667	16,727	26,663	219,931	6,395	159,540
Motorcycles	1,633	422,425	1,734	379,743	20,425	4,878,851	15,319	3,661,145
Parts, except tires*	293,485	117,049	282,223	169,145	3,032,627	1,587,488	2,706,990	1,496,373
INTERNAL COMBUSTION ENGINES								
Stationary and Portable:								
Diesel and Semi-Diesel	214	32,279	14	75,590	1,094	412,150	1,585	536,046
Other Stationary and Portable:								
Not over 8 H.P.	2,774	259,979	3,345	422,770	26,582	2,489,566	24,311	2,334,312
Over 8 H.P.	306	152,318	114	112,977	2,245	1,232,957	2,129	1,505,256
Automobile engines	20	5,068	87	31,619	2,976	343,255	1,132	181,331
Motor trucks and buses	1,474	280,637	3,623	388,286	36,047	4,718,606	20,419	3,082,981
Passenger cars	4	2,695	51	20,125	2,369	573,091	2,417	751,998
Tractors	32	10,152	1	110	74	51,769	145	218,109
Aircraft	669,707	274,741	526,245	228,636	7,275,307	3,168,391	7,595,468	3,278,657
Accessories*								
IMPORTS								
Automobiles and chassis (dutiable)	64	73,354	47	56,527	806	834,606	551	762,563
Other vehicles and parts for them (dutiable)	.....	39,619	.....	53,924	.....	1,718,410	.....	953,894
REIMPORTS								
Automobiles (free from duty)	42	56,620	31	46,056	2,228	2,598,339	496	732,095

* Pounds.

Tire Plants Busy; Holiday Period Cut

Akron Rubber Executives Believe 1925 Will Break Production Records

AKRON, OHIO, Dec. 30—Owing to large orders on hand, only one large automobile tire manufacturing company closed down here for an extended holiday during Christmas week. In recent years it has been the custom for nearly all rubber factories to give their employees a holiday of a week or more, at this season.

Employees at tho Goodyear, Firestone and Miller plants were released at noon Wednesday, and returned to work Friday. Goodrich declared a five-day holiday, closing at noon Wednesday, to reopen Monday.

Rubber executives here are unanimous in the opinion that 1925 will be a record breaking year in automobile tire production. All of the large companies and many of the small ones are now enlarging their capacity to take care of increased business.

The latest company to announce plans for expansion of its operations is the Miller Rubber Co. New machinery is to be purchased, officials state, which will increase its tire output by 20 per cent.

Official announcement has been made of tire production increases planned by Goodyear, Goodrich, Firestone, General and India.

Vulcan Motor Placed in Friendly Receivership

DETROIT, Dec. 30—Affairs of the Vulcan Motor Axle Co. have been placed in the hands of the Security Trust Co. as receiver as part of friendly proceedings initiated by the company and creditors to facilitate a reorganization and refinancing. This is expected to be concluded within a brief period.

The company then will proceed on a greatly strengthened basis with its manufacturing program, which includes the production of bus and truck axles of a special type and also the manufacture of four-wheel hydraulic brakes and equipment under the Lockheed license.

Assets of the company approximate $475,000 and liabilities about $300,000.

Mexico Permits Vehicle Imports Free with Bond

WASHINGTON, Dec. 29—All classes of vehicles may be imported temporarily into Mexico free of duty under a bond or a cash deposit delivered to the customs to guarantee the payment of the customs charges, by a decree of Oct. 25, published in the Diario Official of Nov. 4, and effective from that date, Thomas D. Bowman, consul at Mexico City, advises the automotive division.

The maximum time limit within which re-exportation must take place is fixed at 60 days, although the collectors of the customs have the authority to extend the period for 30 days more in case of exceptional circumstances.

The bond or cash deposit will be forfeited if the re-exportation is not effected within the time limit allowed.

Timken-Detroit Secures Philadelphia Contract

DETROIT, Dec. 30—Timken-Detroit Axle Co. has received the contract for axles to be used in the 250 double-deck gas-electric buses ordered by the Philadelphia Rural Transit Co., according to a statement by the company. These will be of a new design. The housing is a one-piece drop forging of the double-banjo type, which will be fabricated in the company's own forge shops.

Power is transmitted to the wheels from the electric motors through two underslung carriers, fitted with the "F. J." type of worm gearing, for which Timken-Detroit has exclusive patent rights.

Ursus Company Formed to Make Cars in Poland

WASHINGTON, Dec. 29—Responding to the Polish government's offer of large orders for trucks to any foreign group that would agree, besides manufacturing one-third of the order in their own shops abroad, to import and assemble one-third of the order in Poland and to manufacture the last third entirely within Poland, the Ursus Co. has been organized by the Berliot (French) and Spa (Italian) companies. This proposition was first made to several American firms and was refused, according to advices from the trade commissioner at Warsaw to the Department of Commerce.

The two companies forming the Ursus Co. have combined with some local capital and with the Polish government in the construction of the desired plant, about three kilometers from Warsaw, and should be ready for assembling work in 1925. The order is for 600 4-cylinder 3-ton trucks.

PIERCE-ARROW NET GAINS

BUFFALO, Dec. 30 — Pierce-Arrow Motor Car Co. reports net earnings for November at $155,697, compared with $144,299 in October and $20,893 in November of last year. Net earnings for the first nine months of the year were $354,154. Earnings in November were equivalent to nearly $17.50 a share on 100,000 shares of 8 per cent preferred stock after all charges, including prior preference dividends.

CHRYSLER OUTPUT 32,000

DETROIT, Dec. 31—Chrysler output for the first year of the company's existence totaled 32,000 cars, according to a company statement.

FINANCIAL NOTES

Gray & Davis, Inc., assets subject to liabilities have been transferred to a new corporation and the former has received 42,266 shares of American Bosch Magneto Corp. capital stock in exchange, according to a letter sent to stockholders by Arthur T. Murray, president. All preferred stockholders of Gray & Davis have surrendered their stock, leaving 17,891 shares of American Bosch stock to exchange for Gray & Davis common. On and after Jan. 20 there will be issued to depositors of Gray and Davis common one share of American Bosch stock for each 7½ shares of Gray and Davis common deposited.

General Tire & Rubber Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred, payable Jan. 1 to stock of record Dec. 20. The company reports sales of $18,152,000 for the year ended Nov. 30, 1924, as compared with $9,000,000 in the previous year. Net profit was approximately $1,500,000, against $1,200,000 the previous year.

Wickwire Spencer Steel Corp. bondholders' committee has notified holders of certificates of deposit representing first mortgage 7 per cent sinking fund bonds, deposited under agreement dated Aug. 4, 1924, that arrangements have been made for the payment of interest due Jan. 1, 1925. The committee has urged that all bondholders deposit their bonds.

Fisk Tire Fabric Co. first mortgage 10-year 6½ per cent bonds to the extent of $2,000,000 have been sold by Dillon, Read & Co., New York. They are due in 1935. Fisk Rubber Co. will lease practically all of the property of the fabric company and rentals will be sufficient to pay interest and sinking fund charges on the bonds.

Rolls-Royce Co., Ltd., declared, in London, a dividend of 8 per cent. Net profits for the year amounted to £168,598. During the year £70,000 was added to reserve and £18,672 was the balance carried forward.

Briggs Manufacturing Co. stock offered by Merrill, Lynch & Co. and other bankers has been oversubscribed, according to an announcement. Allotments were scaled down 10 to 30 per cent of the original subscription.

Sterling Motor Truck Co., Milwaukee, has declared its 26th consecutive quarterly dividend of 2 per cent, payable Jan. 2.

Doble Secures Writ, Staying Proceedings

SAN FRANCISCO, Dec. 29—A temporary writ of prohibition, staying court proceedings against W. A. Doble, Jr., indicted last September with Abner Doble and Harold E. Haven, as members of a conspiracy to violate the corporate securities act, has been issued here. The Dobles and Haven were indicted following charges that they had sold more stock in the Doble Steam Car Co. than given permission by the State.

The temporary writ was granted on Doble's allegations that there is no such crime as conspiracy in the corporate securities act; that even if a crime had been committed it is barred by the statute of limitations, and that the indictment was not returned within a year of the purported commission of the crime.

If the writs are made permanent by the district court of appeals it will automatically end the cases.

FORM WORKING AGREEMENT

WASHINGTON, Dec. 29—To reduce operating costs and make it possible to increase sales, a working agreement has been entered into by the Robert Bosch Co. and the Eisemann Works, both manufacturers of magnetos and other electrical equipment for automobiles.

Ford Steel Mills Near Completion

Plant at River Rouge to Have Capacity of 100 Tons a Month —Big Money Saver

DETROIT, Dec. 30—Work on the steel mills of the Ford Motor Co. adjoining its foundries and forge shops at River Rouge has progressed to a point which indicates that the company is planning to meet all its steel requirements in its own mills, although nothing official as to the extent of the undertaking has been issued by the company.

In all there will be a capacity of approximately 100,000 tons a month in sheets, billets, blooms, of which about 23,000 tons will be produced from scrap from the present manufacturing plants of the company. Primarily, it is understood, the steel mills are to conserve expense now arising from the shipping of this scrap back to Pittsburgh for remelting—a freight bill of about $2,760,000 annually. The additional capacity of the mills will be in new steel.

Four Fuel Furnaces

As part of the equipment of the steel mills will be four fuel furnaces heated by gas, each with a capacity of about 100 tons, and requiring 15,000,000 cu. ft. of gas daily. Five electric furnaces will be used for mixing alloy steels and final treatment of the metal before cast into parts. Each will be of 20 tons capacity. Heat is developed from eight new generators of 40,000 kilowatts each, three of which are now under construction, and all of which will be ready when the new furnaces and mills are complete.

One of the press mills now building will be 300 ft. wide and 1260 ft. long, the other to be 270 ft. wide by the same length. The building that will house the bar and bloom mills is 400 ft. wide and 1600 ft. long. The operation of the mills will require practically a doubling of the 220 coke ovens now in use at River Rouge to develop the gas for steel heating.

May Scrap Old Cars

With the start of operations in the steel mills there is belief in some quarters that the company will undertake, to some extent, the scrapping of older cars received in trades by its dealer organization, and will make the remelting of these a part of the function of the new steel plant. The company has been carrying on experiments with cars of early manufacture which are believed to have been made with a view to ascertaining the exact worth of these and how they can be handled most efficiently in scrapping.

If such a plan matures it is expected that the company will locate a number of reducing plants at key cities, probably at points at which it now has assembly branches, where these old cars would be scrapped scientifically and prepared for shipping to the steel mills.

By doing this the company could complete a cycle of usefulness for its products, and there are reasons to believe that it has had this under consideration.

INDUSTRIAL NOTES

Northwestern Engineering Works, Green Bay, Wis., specializing in the production of a crane and hoist mounted on a crawler type of tractor chassis, for general yard use, logging, etc., has placed contracts for the erection of a $75,000 addition to its main machine shop at South Pearl and Howard Streets. This is being done to increase the capacity to meet the growing demand for the crane. L. H. Barkhausen is general manager.

Wisconsin Gas Railway Equipment Co. has been incorporated at Oshkosh, Wis., with a capital stock of $150,000 for the purpose of engaging in the business of equipping steam railway coaches with gasoline engine motive power and transmission systems. The principals are S. G. Cromwell, O. E. Woodcock, R. G. Aeder and Earl Woodcock, Plans have not been fully revealed.

Hannibal Rubber Co. plant at Hannibal, Mo., which was to manufacture Mark Twain tires, but which went into a receivership, has been sold by the trustee, J. T. S. Sickman, to the International Shoe Co. of St. Louis for $50,000.

Texas in 1925 to Have $15,000,000 for Highways

AUSTIN, TEX., Dec. 30—It is already assured that Texas will have nearly $15,000,000 to spend in the construction of designated highways during 1925, according to the State highway commission. Of this sum $4,410,169 comes out of the federal appropriation, the allotment having already been made.

It is estimated that revenues from license fees on automobiles collected under the present law will produce $7,700,000 for the State's share. The several counties of the State will get approximately $3,000,000 for other roads than the primary designated system.

In addition to this money, the estimated revenues representing the State's share of the 1 cent per gallon gasoline tax will be $2,870,000.

Should the legislature see fit to pass a law amending the present license fee tax it will not disturb these funds, as the law would not become effective until 1926, whereas if the gasoline tax is increased the increase will probably begin within a short time after passage of the bill.

This means that while the amount of highway funds may be increased there is no likelihood of its being decreased during the coming year.

MOON GAINS IN 1924

ST. LOUIS, Dec. 30—Moon Motor Car Co. reports total shipments and sales for 1924, with the full month of December estimated, slightly in excess of the figures for 1923. It is reported that the company's export business shows a gain of 30.5 per cent over the previous year.

METAL MARKETS

Serene as the steel market appears on its surface, there is noticeable an undercurrent of nervousness among producers who at this time naturally recall that 1924 started in very much like 1925, and that at the end of the first quarter activity fizzled out.

Memories of this unpleasant turn of the tide make for a gratifying amount of conservatism and are likely to act as a brake on a too sudden and too great bulge in prices.

The market starts the new year on a much healthier price basis than it did 12 months ago. Then prices, as indicated by a 5.30c. figure on full-finished automobile sheets, had discounted the general expectancy of a brisk demand continuing over the entire year, which came to naught after a short three months.

Today, going prices are comparatively moderate and certainly no attempt has been made so far to swell values on the basis of what might happen by way of demand three or six months hence.

True it is that the first signs of a higher sheet market are here. Sheet bars have shown a more marked advance in the last few days than other semi-finished steel, which has hardened generally. A $40 sheet bar market can mean only one thing, a 5c. price for full-finished automobile sheets.

While automotive buying so far has differed little in character from that in vogue throughout 1924, consumers being chiefly interested in January and February deliveries, the aggregate volume of orders placed has been good, and, as a result, sheet rollers and strip mills have curtailed the holiday lay-off to the irreducible minimum.

The consumers of heavy rolled products, such as the railroads, structural steel fabricators, etc., and the users of tin plate, all heavy tonnage buyers, now have their orders in, and, light in tonnage as the requirements of the automotive industries may be, it will be the extent of their buying during the next three months that will be the real criterion of the continuance and permanence of the demand.

Pig Iron.—The market for foundry and malleable irons is now on a $22.50 and $23, Valley, basis. Blast furnace interests are not over eager to book orders at these prices, preferring a more pronounced buying movement to develop together with correspondingly higher price levels before bidding more vigorously for fresh business.

Aluminum.—A little more imported aluminum is coming in, but all of this is earmarked against old contracts. The metal arrived last week was Norwegian. Part of this came to the American sales agency of the leading British producer who controls part of the Norwegian production, and the remainder to the American representative of the leading French metal producers. The market continues to live in expectancy of price advances at any moment. Remelted metal enjoys good inquiry from parts and accessory manufacturers at firm prices.

Copper.—The turn in the copper market's fortunes is best indicated by the practice recently adopted by leading copper and brass products manufacturers to base their prices on a fractionally higher metal market than that in effect at the time, the recent rising tendency of copper having made this protection necessary.

Russian Organization Makes Its First Truck

WASHINGTON, Dec. 29—The Central Administration of Motor Trucks, Inc., of Podolia, Russia, organized the early part of this year to build trucks, produced its first 1½-ton truck Nov. 1, and its test was pronounced very satisfactory, according to advices received by the automotive division of the Department of Commerce from the Russian trade commissioner.

The trucks are manufactured complete at the factory, except for the wheel rims, magneto and ball-races. The production program for 1924-25 calls for 500 of the 1½-ton trucks, 100 of the 3-ton trucks and 50 passenger cars.

Calendar

SHOWS

Jan. 2-10—New York, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Bronx Armory. Open to the public except on Jan. 2 and 3 which are trade days.

Jan. 17-24—Cleveland, Annual Automobile Show.

Jan. 23-31—Chicago, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory. Open to the public except on Jan. 23 and 24 which are trade days.

Jan. 25-31—Chicago Annual Automobile Salon.

Feb. 7-14—Kansas City, Mo., Annual Automobile Show.

Feb. 9-14—New York, Eleventh National Motorcycle, Bicycle and Accessory Show, Seventy-first Regiment Armory, under the auspices of the Motorcycle and Allied Trades Association.

Feb. 21-28—San Francisco, Pacific Annual Automobile Show.

March 7-14—Boston, Twenty-third Annual Automobile Show.

March 8-14—Vienna, Spring Fair.

March 20-29—Geneva, Switzerland, Second Swiss International Motor Exhibition.

April 1-17—Sydney, Australia, Royal Agricultural Show. Embraces automobile exhibits.

April 22-May 7—Melbourne, Australia, International Automobile Show, under the auspices of the Chamber of Automotive Industries, in conjunction with the Royal Automobile Club of Victoria.

June—Rio de Janeiro, Brazil, Rio Automobile Show, originally scheduled for October, 1924, but postponed for more extensive arrangements.

RACES

July 26—Paris, Montlhery Track, French Grand Prix.

CONVENTIONS

Jan. 5—New York, Convention under the auspices of the National Automobile Dealers Association, Hotel Commodore.

Jan. 5-9—Chicago, Road Show and Convention of the American Road Builders Association.

Jan. 26-29—Chicago, Eighth Annual Convention of the National Automobile Dealers Association, Hotel LaSalle.

June 22-27—Summer convention of the Automotive Equipment Association at the Broadmoor Hotel, Colorado Springs, Colo.

S. A. E. MEETINGS

Dec. 15—Cleveland Section, Development of Clutches, Ernest C. Wemp, Long Manufacturing Co., Old Colony Club, Hotel Cleveland.

Dec. 18—Metropolitan Section, Multiple Wheeled Vehicles, A. W. S. Herrington and A. F. Masury, Hotel Empire, New York City.

Jan. 15—Indiana Section. Lubrication and Crank Case Dilution, S. W. Sparrow of the U. S. Bureau of Standards.

Jan. 19—Cleveland Section, Preparation of Fuel Charges and Detonation. Arthur H. Denison, Weger Motor Co., Old Colony Club. Hotel Cleveland.

Jan. 20-23—S. A. E. Annual Meeting, Detroit.

Feb.—Indiana Section, Automobile Finishes.

Feb. 16—Cleveland Section, Electrical Instruments and Measuring of Chassis Tests by Means of Them, J. H. Hunt, General Motors Research Corp., Old Colony Club, Cleveland.

Mar.—Indiana Section Developments in Transmission.

Mar. 16—Cleveland Section, Road and Riding Ability, Harry Horning, Waukesha Motor Co., Old Colony Club Hotel Cleveland.

Apr. 9—Indiana Section, Talk by F. E. Hunt, head of electrical division, General Motors Research Corp.

Ford By-Products Bring $13,000,000

DETROIT, Dec. 31—The by-products business of the Ford Motor Co. during 1924 will bring into the company returns in excess of $13,000,000, of which $4,000,000 represents the return from the sales of by-products reclaimed from waste.

Production of Ford cars, trucks and tractors has grown to such an extent that the company gradually has taken over the control of sources of new materials in order to insure constant production. This has led to the development of coal and iron mining, logging operations, glass manufacture and similar basic industries, surplus materials from which are dispensed through a new department and find ready sale in the public markets.

Coal brought into the River Rouge plant from the Ford mines goes into the coke ovens, yielding coke, most of which the company uses, and such by-products as gas, benzol and ammonium sulphate, which are sold and bring in more than $1,150,000 annually.

Slag from the blast furnaces at River Rouge is transformed into Portland cement at a new plant having a capacity of 1000 barrels a day.

At Iron Mountain, now the center of the company's body parts industry, a wood distillation plant is recovering from the hardwood scrap by-products such as charcoal, pitch, cresote, ethyl acetate, refined wood alcohol, methyl acetone and acetate of lime.

A number of these by-products are used by the company, but all in excess of its requirements are sold and will bring in an estimated return of more than $2,500,000 a year. Charcoal, the principal of these by-products, is made into briquets and sells readily for use in dining cars, hotel kitchens and households.

Another source of revenue at Iron Mountain is the sale of surplus lumber.

Plate glass is made at the company's three glass plants. Grades not suitable for Ford cars and glass in small sizes are sold to mirror companies and various other concerns.

The sales of surplus scrap metal and non-metallic material reache more than $4,000,000 a year.

At Hamilton, Ohio, the company maintains a 1200-acre experimental farm adjoining its wheel factory. Farm products and livestock can be added, therefore, to the list, along with electric power, which the company also sells.

Wisconsin Warns Against So-Called "Ford Units"

MILWAUKEE, Dec. 29—The railroad commission of Wisconsin has issued a warning to the hundreds of motor car owners in the State who have received offers of "American units" or "Bankers' shares" in the Ford Motor Co. of Canada, Ltd., that the public investigate the offerings thoroughly before investing. It is pointed out that one offer of so-called American units at $6.50 per unit, or $650 per 100 units, is equivalent to one share which has a current market value of only $454 to $459.

Another offering is of so-called bankers' shares at $5.50 a share, or $550 for 100 units, equivalent to one share of Ford-Canada commanding but $454 to $459 in the current market.

Associations of Commerce throughout Wisconsin have broadcast the warning, together with an official statement of the Ford company that not only is the price quoted for fractional units in excess of the market value of full shares, but there is no provision for representation of these units in any general shareholders' meeting of the corporation.

Medium Priced Cars Gain in Deliveries

DETROIT, Dec. 30—Deliveries of 8168 new cars in November brought the total in the State for the first 11 months to 162,803. The figures for November show a falling off from the total of 8751 in November, 1923. Medium priced cars, ranging from $1,200 to $1,800, showed a gain during the month of slightly better than 9 per cent over sales in the same price class last year. Truck sales for the month were 970, which compares with a total of 1132 in the same month last year.

The falling off in both passenger car and truck business is due largely to reduced buying in Detroit and other industrial cities in the State. In the farming districts many of the counties show a gain over totals in the previous year, and in practically all of them business was proportionately better than in the industrial centers.

The Ford percentage of the month's business was an even 50, which compares with a percentage of 54.4 in November, 1923. Cars in the low priced field, including Ford, showed a total of 63 per cent for the month, as compared to 72.5 in the preceding year. Cars in the $1,000 price class and under sold 76.5 per cent of the total month's business, comparing with 84.8 per cent a year ago.

Medium priced car sales were 21 per cent, as compared to 12.8 per cent last November. High priced car sales maintained about the same percentage, approximately 2.5.

All the leading medium priced makes show gains over the previous November's business.

Ford truck sales approximated 70 per cent of the total month's business this year.